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1905

REPORT

OF THE

State Horticultural Association

OF

PENNSYLVANIA

FOR 1905

THE LIBRARY OF THE
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UNIVERSITY OF ILLINOIS

WM. STANLEY RAY,
STATE PRINTER OF PENNSYLVANIA.
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CONSTITUTION AND BY-LAWS OF THE STATE HORTICULTURAL ASSOCIATION OF PENNSYLVANIA.

Article I. This society shall be entitled "The State Horticultural Association of Pennsylvania," and its object shall be the advancement of the science of horticulture and pomology.

Article 2. Any person may become a member of this society by a vote of a majority of the members present at any meeting, and by paying into the treasury the sum of one dollar annually; or the payment of one dollar to the treasurer, at any time, shall constitute membership, and entitle said member to a copy of the proceedings, The payment of ten dollars at one time will constitute life membership.

Article 3. Its officers shall consist of a president, three vice presidents, recording and corresponding secretary and a treasurer, all of whom shall be elected annually by ballot.

Article 4. The following committees shall be appointed: A committeeof five on nomenclature; a committee of three on insects, of whom the professor of entomology shall be chairman; an executive committee consisting of the elective officers of this association and three of whom, including the president, shall constitute a quorum; and a general fruit committee, consisting of one from each county represented, with a general chairman of the whole, each member of the fruit committee to have the privilege of appointing two assistants.

Article 5. The society may, at any time, elect honorary members.

Article 6. The society may, from time to time, appoint professors on entomology, botany, horticultural chemistry and geology.

Article 7. This constitution may be altered or amended by a vote of two-thirds of the members present at any regular meeting, notice of the proposed amendment, in writing, having been previously given.

Article 8. Seven members shall constitute a quorum for the transaction of business.

BY-LAWS.

Article 1. The committee on nomenclature shall collate and decide the standard and synonymous names of all fruit known in the society with the authorities for each, and report, so far as practicable, at each regular meeting, and record the same in a book kept for that purpose.

Article 2. The general fruit committee shall carefully and thoroughly investigate the subject of fruit culture in general. Each local committee of three shall collect such useful and interesting information in relation to the subject as may be in their power, and

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embody the same in monthly reports, to be made to the general chairman; such reports to be by him examined and embodied in his annual and semi-annual reports. Also that the said county committee shall form ad interim committees for their respective counties, and futher that said ad interim committees are hereby authorized to publish the reports in the "Gardener's Monthly," or such other paper, as they may select, the same having been first submitted to the chairman of the general fruit committee for his approval: Provided, That said publication shall be free of expense to the association.

Article 3. The annual meeting of the association shall be held on Tuesday before the third Wednesday of January of each year, at such a place as the executive committee may appoint, at which time the election for officers shall take place; said officers to serve from the close of the meeting at which they are elected to the close of the succeeding annual meeting, at which an exhibition and discussion of fruits shall take place and other business transacted in the following order:

1st. Reading of minutes of previous meeting.
2d. Roll call and dues collected.
3d. Election of officers.
4th. Reports of officers.
5th. Reports of standing committees.
6th Reports of special committees.
7th Unfinished business of former meeting.
8th. New business.

The nomination and election of new members shall be in order at any time during the session.

Article 4. Other meetings may be conveyed by the executive committee at such time and place as they may appoint.

Article 5. No member who is in arrears for dues shall be eligible for any office, or serve on any standing committee; and any member who shall neglect to pay his dues shall cease to enjoy the privileges of membership.

STATE HORTICULTURAL ASSOCIATION OF PENNSYLVANIA.

OFFICERS FOR 1905.

PRESIDENT.

Gabriel Hiester, ...Harrisburg.

VICE PRESIDENTS.

Hon. W. T. Creasy, ...Catawissa.
Thos. B. Meehan, ...Germantown.
Dr. J. H. Funk, ...Boyertown.

RECORDING SECRETARY.

Enos B. Engle, ...Waynesboro.

CORRESPONDING SECRETARY.

Wm. P. Brinton, ...Christiana.

TREASURER.

Edwin W. Thomas, ...King of Prussia.

MEMBERSHIP.

LIFE MEMBERS.

Bartram, J. Hibberd, Milltown, Chester Co.
Boyer, John F., Mt. Pleasant Mills, Snyder Co.
Brinton, Wm. P., Christiana, Lancaster Co.
Chase, Howard A., Perry Building, 16th and Chestnut Sts, Philadelphia.
Chase, Charles T., Perry Building, 16th and Chestnut Sts., Philadelphia.
Calder, Dr. James, Harrisburg, Dauphin Co. (deceased).
Cornelius, Robert, Philadelphia (deceased).
Creasy, Hon. W. T., Catawissa, Columbia Co.
Engle, Henry M., Marietta, Lancaster Co. (deceased).
Engle, John G., Marietta, Lancaster Co.
Engle, Enos B., Waynesboro, Franklin Co.
Ermentrout, Hon. Jas. N., Reading, Berks Co.
Fox, Cyrus T., Reading, Berks Co.
Garrettson, Joel V., Floradale, Adams Co.
Good, C. W., Waynesboro, Franklin Co.
Hacker, William, Philadelphia (deceased).
Hartman, D. L., Etters.
Hayes, Charles P., Philadelphia.
Heyser, Jacob, Chambersburg, Franklin Co. (deceased).
Hildrup, W. T., Raleigh, N. C.
Hiller, Casper, Conestoga, Lancaster Co. (deceased).
Hiller, Peter C., Conestoga, Lancaster Co. (deceased).
Hoopes, Josiah, West Chester, Chester Co. (deceased).
Huff, L. B., Greensburg.
Huff, Burrell R., Greensburg.

Landis, Israel, Lancaster, Lancaster Co.
McCormick, Harry, Harrisburg, Dauphin Co. (deceased).
McCormick, James, Harrisburg, Dauphin Co.
Martin, J. O., Mercersburg, Franklin Co.
Meehan, S. Mendelson, Germantown, Philadelphia Co.
Pannebaker, Wm. M., Virgilina, Va.
Reist, Peter S., Lititz, Lancaster Co. (deceased).
Reist, John G., Mt. Joy, Lancaster Co.
Scribner, Prof. F. Lamson, Knoxville, Tenn.
Shaffner, Jacob, Harrisburg, Dauphin Co.
Swift, Rev. E. P., Mt. Oliver, Allegheny Co. (deceased).
Thomas, George B., West Chester, Chester Co.
Thomas, Edwin W., King-of-Prussia, Montgomery Co.
Van Deman, H. E., 3630 13th St., N. W., Washington, D. C.
Wertz, D. Maurice, Quincy, Franklin Co.

HONORARY MEMBERS.

Barry, P., Rochester, N. Y.
Downing, Charles, Newburgh, N. Y. (deceased).
Ellwanger, George, Rochester, N. Y.
Edge, Thomas J., Harrisburg, Pa.
Garber, J. B., Columbia, Pa. (deceased).
Heiges, Prof. S. B., Saxe, Va.
Meehan, Thomas, Germantown, Pa. (deceased).
Michener, Dr. E., Toughkenamon, Pa. (deceased).
Parsons, Prof. S. B., Flushing, N. Y.
Parry, William, Parry, N. J. (deceased).
Rathvon, Prof. S. S., Lancaster, Pa. (deceased).
Rowe, Hon. D. Watson, Chambersburg, Pa.
Rutter, John, West Chester, Pa. (deceased).
Saunders, Wm., Washington, D. C. (deceased).
Stitzel, George D., Reading, Pa.
Thomas, John J., Union Springs, N. Y. (deceased).
Warder, Dr. John A., North Bend, O. (deceased).
Wilder, Marshall P., Boston, Mass. (deceased).
Wickersham, Dr. J. P., Lancaster, Pa. (deceased).
Willetts, Rev. Dr., Philadelphia, Pa. (deceased).

ANNUAL MEMBERS.

Allison, J. W., Mercer.
Armsby, Dr. H. P., State College.
Barnard, C. P., Northbrook.
Baxter, C. W., Haddonfield, N. J.
Bishop, W. O., 1302 William St., Harrisburg.
Bolton, W. P., Bonview.
Boyer, F. D., New Cumberland.
Bridges, George, Carlisle.
Bracken, J. W., Hollidaysburg.
Breisch, D. D., Ringtown.
Breisch, Robt., Ringtown.
Bucher, Dr. I. Riley, Lebanon.
Butler, Allen, Ogontz.
Butz, Prof. Geo. C., State College.
Christman, James M., Fort Hunter.
Cooper, Calvin, Bird in Hand.
Cotter, Lawrence, Danville.
Coursen, I. H., Carverton.
Critchfield, Hon. N. B., Harrisburg.
Denlinger, Amos B., Iva.
Demming, H. C., Harrisburg.
Eastabrook, F. L., Athens.
Eby, Amos F., Mount Joy.
Engle, Ezra B., Marietta.
Erb, Amos H., Lititz.
Eslinger, Samuel L., Good Hope.
Frankenfield, Miss W. S., 223 S 7th St., Easton.
Foster, T. C., Harrisburg.
Funk, Dr. J. H., Boyertown.
Gilbert, David, Sr., Coatesville.
Good, Martin R., Narvon.
Graybill, Hon. D. W., East Petersburg.
Groff, Dr. Geo. G., Lewisburg.
Haines, Mary M., Cheltenham.
Harnish, H. H., Hubers.
Harper, Wm. Warner, Chestnut Hill.
Harris, Phillip, Light Street.
Herr, Daniel D., Lancaster.
Herr, David S., Mountville.
Hess, Enos H., Lancaster.
Hiester, Gabriel, Harrisburg.
Huston, Chas. L., Coatesville.
Johnson, W. B. K., Allentown.
Hill, Dr. S. S., Minersville.
Jones, S. Morris, West Grove.
Keath, Dr. J. W., Shaefferstown.
Keller, Walter J., Pottsville.
Kloss, D. S., Tyrone.
Koons, Dr. P. R., Mechanicsburg.
Kready, John, Mount Joy.
Kraybill, S. S., Mount Joy.
Krewson & Son, Jas., Cheltenham.
Laub, H. H., Jr., Lewistown.
Leyder, J. S., 319 Peffer St., Harrisburg.
Longsdorf, C. L., Floradale.
Loop, A. I., North East.
McGowan, H. G., Geiger's Mills.
McLanahan, J. King, Hollidaysburg.
McSparran, W. F., Furniss.
Marshall, Mrs. J. L., 239 4th Ave., Pittsburg.
Mayer, H. M., Rohrerstown.
Mayer, Dr. I. H., Willow Street.
Meehan, Thos. B., Germantown.
Miller, John D., Newton Hamilton.

Maffat, Miss M. A., 264 S. Franklin street, Wilkes-Barre.
Moon, Wm. H., Morrisville.
Mosser, H., Myerstown.
Newcomer, W. S., Glenrock.
Nissley, P. R., Mount Joy.
Patterson, Jas. G., Stewartstown.
Peters, Earl, Mt. Holly Springs.
Persing, E. E., Sunbury.
Purvis, Timothy, Hunsecker.
Pyle, J. W., Kennett Square.
Rakestraw, Thomas, Kennett Square.
Reichert, J. H. Host.
Richards, A. C., New Paris.
Rife, Jacob L., West Fairview.
Root, A. W., Manheim.
Root, J. W., Manheim.
Rupp, D. C., Shiremanstown.
Rush, John G., West Willow.
Schaeffer, Dr. N. C., Lancaster.
Schock, Oliver D., Hamburg.
Scholl, Calvin P., Fisherville.
Sharpless, John D., London Grove.
Shepherd, J. W., Scranton.
Sierer, Dr. A. L., Harrisburg.
Snavely, H. C., Lebanon.
Snavely, H. H., Lancaster.
Snavely, J. R., Harrisburg.
Stein, Geo. E., East Prospect.
Stoney, R. J., Jr., 424 5th Ave., Pittsburg.
Stout, W. H., Pinegrove.
Stover, F. S., Bowmansville.
Surface, Prof. H. A., Harrisburg.
Sweatnam, Mrs. Jennie W., Mast Hope.
Traver, F. E., Wyebrook.
Wagner, Geo. A., Alinda.
Watts, Prof. R. L., Scalp Level.
Weast, Geo. B., Harrisburg.
Weise, H. B., Parkesburg.
Wilbur, Harry, Bethlehem.
Williamson, E. C., Morrisville.
Yeager, A. H., Lancaster.
Zigler, Amos, Rowenna.

REPORT

OF THE

FORTY-SIXTH ANNUAL MEETING

OF THE

STATE HORTICULTURAL ASSOCIATION

OF

PENNSYLVANIA

Held at Harrisburg, Pa., January 17-18, 1905

The attendance throughout was good and much interest manifested in the papers and discussions. There was a large display of apples, although some of the specimens were inferior in quality and appearance.

The following new members were enrolled during the sessions and since last annual meeting:

LIFE MEMBERS.

D. L. Hartman, Etters.
Huff, L. B., Greensburg.
Huff, Burrell R., Greensburg.

ANNUAL MEMBERS.

I. H. Coursen, Carverton.
Mrs. Jennie W. Sweatman, Mast Hope.
John D. Miller, Newton Hamilton.
H. B. Weise, Parkesburg.
W. O. Bishop, Harrisburg.
J. H. Reichert, Host.
Mrs. M. A. Moffat, Wilkes-Barre.
Dr. S. S. Hill, Wernersville.
Lawrence Cotter, Danville.
R. J. Stoney, Jr., Pittsburg.
Harry Wilbur, Bethlehem.
Chas. L. Huston, Coatesville.
David Gilbert, Sr., Coatesville.
F. L. Eastabrook, Athens.
Mrs. W. S. Frankenfield, Easton.
Walter J. Keller, Pottsville.
Dr. A. L. Sieler, Harrisburg.
Jas. G. Patterson, Stewartstown.
Dr. J. W. Keath, Shaefferstown.
C. W. Baxter, Haddonfield, N. J.
F. D. Boyer, New Cumberland.
H. Mosser, Myerstown.
Dr. Geo. G. Groff, Lewisburg.
J. S. Leyder, Harrisburg.
John D. Sharpless, Londongrove.
J. W. Shepherd, Scranton.
H. H. Laub, Jr., Lewistown.
Jas. M. Christman, Fort Hunter.
George Bridges, Carlisle.
Geo. B. Weast, Harrisburg.

The meeting was called to order at the appointed time by the President, and after reading and approval of minutes of previous meeting, and the usual recess of five minutes for payment of dues, the credentials of A. N. Brown, Wyoming, Del., as a delegate from the Peninsula Horticultural Society of Delaware, and E. S. Black, Hightstown, and Wm. H. Reid, Tennent, N. J., as delegates from the New Jersey State Horticultural Society, were presented and accepted, and they were accorded the privileges of the floor.

The following committees were announced by the chair:

Nominations.—Calvin Cooper, Prof. Geo. C. Butz, John G. Engle.

Auditing Committee.—D. M. Wertz, D. D. Herr, Jacob L. Rife.

Nomenclature and Exhibits.—J. Hibberd Bartram, J. W. Pyle, John G. Reist.

REPORT OF GENERAL FRUIT COMMITTE FOR 1904.

A careful study of the reports of correspondents reveals the fact that nearly every line of horticulture is making decided advancement in this great State. Much encouragement is to be found in the 1904 reports. Very few write in a pessimistic tone, although all have had difficulties to overcome. But the obstacles which at times seem to be almost unsurmountable are no greater than the barriers encountered in sister states. We believe Pennsylvania gardeners and fruit growers have as much grit, wisdom and determination as horticulturists in neighboring states, and the battles to be fought here are no greater—Victory requiring hard fighting anywhere and everywhere.

We repeat that there is much encouragement in the 1904 reports. They indicate progress. Disputed questions are being settled slowly but surely. Information is more positive and more definite. We know better what to plant, how to plant, and how to care for our plantations.

APPLES.

The 1904 apple crop in Pennsylvania was much larger than last year, and probably above the average. Only seven correspondents report a light yield; eleven a medium crop; twenty a good crop, and quite a number in reporting the yield used such terms as "enormous," "the largest," "very large," and "extremely large." The quality in most counties has been good or excellent, some reporting the best. The main complaint has been small sized fruit on account of overbearing, and protracted drouth in some sections. Twenty-five correspondents state that their apples are keeping well. About half this number report that their fruit is keeping fairly well and a few express disappointment as to keeping qualities.

The answers to the question "Which are the three most profitable apples in your county," are exceedingly interesting. Of the fifty-five growers who answer this question, thirty-five give the Baldwin first place. The vote in favor of this popular old variety is practically unanimous in Baldwin counties—that is where climatic conditions are favorable to this variety. York Imperial is forced

to second place. The eighteen votes in its favor come almost entirely from southeastern counties. Although Baldwin takes first place as a money maker, there are few large commercial orchards of this variety, but the number of such plantations is increasing. It is doubtful whether any of our Baldwin growers can show up profits equal to those of the York Imperial enthusiasts. But a vigorous note of warning runs throughout the 1904 reports regarding the most profitable varieties of apples. The once popular commercial apple, Ben Davis, is voted down so far as cultivation in Pennsylvania is concerned. Only five report it among the three most profitable. On the other hand, apples of good quality are making rapid strides to the front. Smokehouse for instance, receives a slightly larger vote than Ben Davis. People are beginning to buy apples for their quality and not merely for their looks. This general trend should be kept in mind by growers starting new orchards. We should plant trees which will produce quality as well as quantity. It is probably a mistake to plant York Imperial where the Baldwin thrives. And in counties where the Baldwin fails as a commercial apple and where the York Imperial takes first place, it is hoped that some variety will yet be found which possesses all the good points of York Imperial and which far surpasses it in quality. We call particular attention to the varieties grown by Dr. J. H. Funk, of Berks county, who at a former meeting of this society discussed their merits and who writes most favorably concerning their behavior the past season. A small test orchard should form a valuable adjunct to every large commercial orchard. If there is anything better than York Imperial which will make as much money per acre, by all means lets have it.

Northern Spy is voted third place in the list for profit. Varieties mentioned three or more times besides the ones already named, are Rhode Island Greening, Rome Beauty, Smith's Cider, Grimes Golden, King and Summer Rambo.

The matter of storage houses is receiving increased attention. Fruit growers realize as never before the necessity of proper storage facilities. The bulk of the winter apple crop is sold too soon in the fall or early winter to secure the largest profit and the effect of this rush for the market is disastrous to prices. Low prices are inevitable. A more even distribution of the crop during the entire period of consumption would have a most desirable effect in raising prices. But not one grower in ten is prepared to store apples under the proper conditions. Cellars are generally used and very few are at all suitable to keep apples for any considerable period. Undoubtedly the best houses are those in which the temperature is controlled by the use of ice. But this kind of storage is financially impossible with the majority of farmers and even orchardists. The great need on hundreds of farms is a cheap, well and properly built fruit house which will enable the grower to hold his fruit in perfect condition until March, April or May. The chairman of this committee expresses the hope that this matter will receive special attention at our next annual meeting in the way of places and recommendations for such houses as are practicable and within the means of the average grower or farmer to erect. Expensive ice storage frightens the small grower out of the notion of any kind of storage except cellars.

Favorable seasonal and climatic conditions have much to do with success or failure in Pennsylvania, but they are not the most potent factors. Careful attention all along the line usually brings success. On the other hand the grower who neglects tillage, feeding, pruning and spraying cannot look for entire or even fair success. Orcharding to-day requires wisdom, industry and persistency.

As to controlling the apple tree borer, the use of the wire and knife are almost universally recommended. Protection by paper or a fine mesh wire screening is practiced by a few. Dr. Funk states that he has not been troubled by borers since he began the use of lime, salt and sulphur. Prof. Geo. C. Butz recommends the use of Thum's sticky preparation. Another grower uses white lead and linseed oil. The protection of birds is recommended by another.

Regarding the extent of apple tree planting, fifteen report a decrease, six no material change and twenty-seven an increase. The new plantations are set mostly by commercial orchardists rather than by farmers.

PEARS.

Concerning the 1904 yield of pears, two correspondents report a total failure; thirteen a light crop; six a good crop and a few state it was large, very large or immense, twenty-eight correspondents report good quality, seven medium and six poor.

The vote on the most profitable varieties stood as follows: Bartlett thirty-four; Kieffer seventeen; Seckle sixteen; Clapp's Favorite ten; Duchesse D'Angouleme seven; Sheldon four. In answer to the question "Have you found pears as profitable as apples," twenty-five replied no; twelve yes, and four that they had found pears more profitable than apples.

Judging from the opinion held by our correspondents the much feared and dreaded pear blight is as prevalent as ever. Twenty correspondents report that the disease is on the decrease while the same number say it is on the increase. It is evidently the worst on low ground and in very rich soils. To avoid or partially avoid blight there seems to be a consensus of opinion that a moderate hardy growth should be encouraged rather than excessive wood growth. A rapid, brashy growth is most susceptible to blight. This being the case, high feeding and thorough tillage in fertile soils endangers the lives of the trees. Mineral fertilizers may be used liberally while nitrogenous compounds, including stable manure must be used cautiously in pear orchards.

PEACHES.

The majority of Pennsylvania peach growers are discouraged. A series of crop failures or partial successes has caused many to condemn the business. The 1904 crop in most orchards was a total failure or entirely too light to make a profit or even pay expenses. Encouraging reports come from favored districts, although only five growers report a large crop and a few more refer to the yield as good or medium. The extremely severe weather of last winter is at the root of the trouble in many sections where the trees were severely injured or even killed to the ground. Fruit buds were winter killed in hundreds of orchards.

The reports on "Yellows" are discouraging. Five report a decrease in the prevalence of the disease while nineteen state that the disease is increasing.

The opinions expressed as to the most profitable varieties of peaches are overwhelmingly in favor of Crawford's Late, mentioned nineteen times and Elberta eighteen. Smock is mentioned by nine correspondents. Champion, Old Mixin, Mountain Rose and Stump are favorites.

The replies to the question "D o you conconsider a peach orchard a profitable investment?" are very interesting. Seventeen report the business profitable. The large vote is really surprising, considering the unfavorable seasonal conditions in many sections of the State during the past few years. Not a few of the affirmative replies, however, are accompanied by "ifs," as if the yellows does not kill the trees; if the trees are not winter killed; if the buds are not destroyed by cold weather or frost. These "ifs" are not controllable. Eighteen correspondents say "no" as to the profits, and a York county grower emphasizes his views by replying "no, no, no." Dr. J. H. Funk is the most enthusiastic so far as profits are concerned, stating that the business is "extremely profitable."

PLUMS.

The 1904 plum crop was a signal success. Quite a number of growers report the crop as enormous, immense and the largest ever known. Ten growers report a very heavy yield; eleven a good crop; only eight a light crop and no total failures are mentioned. The 1904 conditions were generally most favorable. The severe winter weather interfered in a very few places and some complained of much fruit being destroyed by rot.

In the plum orchard as well as on the battle field the "Japs" are winning. The Japanese varieties easily take first place for profit. Twenty-four growers report them the most profitable; seven favor the Domestic or European and five the American class. Abundance leads in popularity, receiving ten votes; Burbank eight; Red June six and Wickson two. No other variety of any class is mentioned more than once.

QUINCES.

There are thirty negative replies to the question "Are quinces grown in your county with success?" and about half this number of affirmative answers. Blight and borers are the most potent causes of failure. There are very few trees planted for commercial purposes. The demand for the fruit is also greatly limited.

CHERRIES.

The 1904 cherry crop was above the average. A dozen correspondents reported a heavy or very heavy yield, thirty a good yield and only a few reported light crops. Early Richmond leads as the most profitable variety, receiving eighteen votes. Gov. Wood comes in next with ten votes. English Morello six; Black Tartarian six; Large Montmorency five; Dyehouse four; Napoleon four; Yellow Spanish two; May Duke two; Conestoga two; Montmorency Ordinaire two.

GRAPES.

The 1904 grape crop was quite satisfactory in most counties. Seven correspondents report a heavy yield, thirty-one good and nine light. Concord is in the lead as usual, being placed in the list of the three most profitable varieties by forty-three correspondents. Niagara comes in second with twenty-five votes; Worden fourteen; Moore's Early five; Campbells Early four; Brighton four; Moore's Diamond two; Isabella, two, and Delaware two. The spraying of this crop is not practiced to any extent except by commercial growers. They find spraying to be a necessity and it is entirely efficient when properly done.

SMALL FRUITS.

As to which are the more profitable, red or black raspberries, twenty-one growers report in favor of the red and twelve in favor of black. Four correspondents think the two classes are equally profitable. The red berries bring larger prices on the market, but they are more difficult to handle in good condition. There is an increasing demand for red raspberries.

Blackberries are regarded profitable by thirty-one growers, while eleven give negative replies. Some small markets are flooded with wild blackberries at prices that cannot be met by growers of improved varieties.

The cultivation of all classes of small fruits is on the increase in most counties.

VEGETABLES.

Forty-two correspondents report that market gardening is profitable in their localities, while six give negative answers to this question. The lack of good markets is generally the cause of the failures reported. The favorable replies should be most encouraging to our market gardeners and to those contemplating engaging in the business. We believe there are many opportunities for profitable gardening all over the State. A great deal of produce is shipped into our State which could be grown profitably at home.

Cabbage occupies first place as the most profitable vegetable. Early Jersey Wakefield and Charleston Wakefield are most extensively grown for market. For second early, Early Summer and Succession rank high. Next to cabbage, tomatoes are considered by our correspondents as the most profitable, and Earliana the most profitable early tomato. Stone is the most popular late tomato. Matchless is also a favorite.

ORNAMENTALS.

Thirty-one correspondents say there is an increase in the use of plants, trees and shrubs and fifteen report no increase. The members of this organization should exert every possible influence to create greater interest in the beautifying of house grounds, school grounds, road sides, cemeteries, village streets and commons. Such plantations have a value that cannot be estimated in dollars.

NATURE STUDY.

It is a pleasure to report that nature study is receiving increased attention in the rural schools of our State. Thirty correspondents

believe this to be the case, while fourteen say they have not observed any increase. The report, however, is exceedingly encouraging. Nature study in our public schools is not compulsory as in some other states. The teaching of the subject is purely optional in Pennsylvania. We believe our State Horticultural Association and all kindred organizations should work unitedly for the addition of nature study to the curriculum of our public schools. An immense amount of good is being done in New York State by the teaching of nature study, and we would see the same desirable results in Pennsylvania. The farm would be better liked by our boys and the business of farming would be more popular. The power of observation would be developed and perhaps the next generation of fruit growers would detect the presence and destructiveness of insect and disease pests before they have worked such great devastation as has been the case with the San José Scale. Nature study in our schools would impart a vast amount of useful knowledge to the students. It would create an intense love for the beautiful and interesting things of nature which is woefully wanting in the average country boy or girl and without this love for nature we cannot look for happy, contented farmers in the future.

SPRAYING.

Spraying is limited mostly to rather extensive commercial plantations. The results where the work is done with care and skill, are very satisfactory. The practice of spraying is growing slowly but surely.

THE SAN JOSE SCALE.

The San José Scale is the Goliath of the Pennsylvania fruit grower. Although unlike Goliath in stature he is well armored and fully as powerful in his particular work of destruction, and it takes a real David to meet him successfully on the battle field. Many a fruit grower has not had the nerve to tackle the San José Goliath. They have stood off afar and this giant has had his own way in slaying trees by the thousands. Others have mustered together enough courage to go out and meet him, but failed to slay the monster because not trained from their youth up. But the Davids, thoughtful, trained, brave, confident, have gone forth with slings loaded with lime, salt and sulphur, and by waging an unflinching warfare the enemy has been slain.

The San José Scale is evidently present in greater or less number in probably every county of the State, although a few correspondents say they do not know it to be present. Four-fifths of the correspondents claim that it is multiplying and spreading rapidly, the other fifth holding the opposite view or that it is actually decreasing. The damage is variable. The insect has not made material headway in some orchards and no real damage has been done. We thing it safe to say that the damages have not yet proved serious in more than half the counties. But the reports from many counties, particularly in the southeastern part of the State, indicate heavy damages. Losses and damage are expressed as follows:

"Some trees killed," "many orchards ruined," "thousands of trees killed," "a serious matter," "much damage done," "thousands of dollars lost," etc.

In many instances nothing is being done to control the pest. This is almost uniformly the case with general farmers who regard the orchard a side issue. It will be exceedingly difficult if not impossible to get the mass of our farmers to spray their large, poorly farmed trees. In fact it would not pay many farmers to spray their old trees, many of which are inferior varieties. Those who make orcharding a distinct business cannot afford not to spray and the lime, salt and sulphur treatment is almost universally applied. Various properties are used in preparing this mixture.

FERTILIZERS.

Commercial fertilizers are generally and extensively used by gardeners and fruit growers. Factory mixed goods are the most commonly employed. There is a growing tendency, however, to prepare the goods at home mixing on the barn floor or other smooth floor. The advantages of home mixing are, first a saving of several dollars per ton; second, getting what you want in the form you want; third, the ration can be mixed to suit the crop for which it is to be applied.

TILLAGE.

Tillage is a necessity to the young tree. All the correspondents who venture remarks on tillage take this position. The young tree must be cultivated until it begins to bear. Then growers do as they please. The same results are or may be procured by different methods of tillage and mulching, or by a combination of these operations. Some continue clean tillage after the trees begin bearing, sowing cover crops in July or August. Others keep the bearing orchard in sod and by careful attention to other matters succeed in producing excellent crops. Some follow a system of mulching the efficiency of which depends on the quantity and quality of the mulch. Conditions are so variable that there is no one best system suited to all localities. The constant aim should be to maintain a hardy, healthy, vigorous growth, and variable conditions require different methods.

NOTES FROM CORRRESPONDENTS.

AUSTIN WRIGHT, ALUM BANK, BEDFORD CO.

The planting of new orchards in this county has been on the increase for the past ten years. As the apple is the only fruit which can be conveniently marketed in this section there is very little attention given to any other fruit. Peaches are grown only to supply local demand. Within the past year the San José Scale has been observed in certain localities, but the spread of the pest has certainly not been very rapid. A disease not well understood has been observed in apple orchards within the past few years. In June or July the foliage turns yellow and the leaves fall so fast that

trees are soon almost denuded, after which a new but sickly growth of new leaves appears. The fruit from such trees is very much below the average in size and quality. The cause of this disease has not been determined, nor any remedy applied.

JAMES W. ANDERSON, Stewartstown, York Co.—I am alarmed in regard to the San José Scale, and if there is not vigorous effort made to check its ravages we will be knocked out of business in less than ten years. Our legislature ought to make an appropriation for this very important work and have men visit all fruit growers and nurserymen and compel them to spray.

D. M. WERTZ, Quincy, Franklin Co.—I have tried no new varieties. I have marketed nothing but peaches, selling nearly 22,000 baskets the past season. We are troubled with yellows, but the worst of all San José Scale, woolly aphis, shot hole borer, root gall, crown gall, borers, blight around the collar of apple trees, twig blight and a number of other pests to make ones life miserable.

THEODORE DAY, Dyberry, Wayne Co.—This is third year of big apple crop and most trees have made little growth. Good grafts were scarce last spring and I did very little grafting. Most trees were in poor condition for grafting. A large share of the big crop of apples wasted. Nearly all our farms are rough hill sides and hard to work. All our best young people go to towns or elsewhere, leaving nearly all our farms very light handed, and it does not pay to work them with poor hired help, or to pay high wages.

W. H. STOUT, Pine Grove, Schuylkill Co.—The season was cool and wet, fungus and rot serious, but little damage to fruit by insects. Apples were so abundant that they were unprofitable, with quantities wasted, not with cost of marketing. Plums were abundant and found market at low prices. Peaches being a failure helped the sale of the plums which might otherwise have been unprofitable. Competition is becoming more keen, so that the consumer and not the producer profits by large crops.

J. B. REIFF, Spring City, Chester Co.—We should have some legislation compelling every one to spray or some authorized inspector to see that it is done. We, as nurserymen are compelled to fumigate all our stock sent out and our careless neighbors keep on breeding scales faster than we are able to kill them. While we can send out our stock from our nurseries perfectly clean and in good shape, but planted among stock covered with scales, they cannot grow and we receive censure for sending out stock infested with scales. Until we get some legislation that is much more far reaching than at present we cannot look for an extermination of the scale pest, while the salt, lime and sulphur is number one, there are too many who will not go to the trobule to use it and the consequence is that all suffer alike, the just and the unjust.

OLIVER D. SCHOCK, Hamburg, Berks Co.—Fruit in general was of excellent quality; best in many years. As a judge of the fruit displays at various fairs the past fall, the above was made self evident by the character and quality of the fruit exhibited. The new varieties are also in evidence and some of these are very promising.

The San José Scale has made serious gains and many of the larg-

est and best orchards are menaced by total destruction. In many cases the owners are unaware of the actual conditions until too late.

GABRIEL HIESTER, Harrisburg, Dauphin Co.—In my opinion the severe winter of 1903-4 injured the older peach trees—that is those that had produced several crops. Many of the fruit buds were frozen and the balance appeared rather weak and a great many peaches dropped off when about the size of peas. When the peaches ripened up they lacked size and color. Young trees that had never born a crop before produced fine peaches and plenty of them. Summer and fall apples did very well, but the severe frost on September 22, seemed to loosen the stems of the Baldwin and York Imperial—the small apples did not grow after that, and a great many more dropped sooner than usual at that season—even those that remained on the tree did not keep as well as usual, but had to be sold while the market was full of second class fruit.

Keiffer pears came in the first of October and stopped the sale of good pears entirely. The market has not yet recovered, and I doubt if Duchesse and Lawrence will bring as good prices this winter as Duchesse were bringing at that time.

DR. J. H. FUNK, Boyerstown, Berks Co.—I have planted quite extensively of southern varieties of apples and these are doing better than northern varieties, proving good bearers, hanging well to trees, and proving late keepers. Stayman's Winesap takes first place. I am top working many varieties, such as Stark, etc., to Stayman's Winesap. Rome Beauty is a heavy bearer. Early Winter is of excellent quality and one of the most showy apples we have. Collins Red is an enormous bearer, late keeper and quality medium and a good seller. Mammoth Black Twig, tree a strong grower, medium early bearer, fruit large, dark red, quality excellent, a very late keeper. Black Ben Davis, early and a heavy bearer, fruit very showy, solid red, quality little better than Ben Davis. Gilbert closely resembles Mammoth Black Twig. Salome is not proving satisfactory.

Notwithstanding the condemnation of the public, the Keiffer pear is holding its own and where understood and properly treated it is rivalling the Bartlett in every respect. It is beautiful in appearance, large, guality good, smooth at core, having lost all that rough sandiness for which it is noted when improperly grown and on uncongenial stock they make me more money than ony other pear I have tried.

Sour cherries are a good crop, bringing big returns.

Peaches are better than Standard Oil stock, when attention is given, well fed, well pruned and clean culture, they will turn out more dollars than anything you can plant. I have had plenty of trees that have given me from five to twenty dollars per tree. Last season from 100 eight year old trees occupying one-half acre I sold $1,280 worth. This season from one block of 1,073 trees, covering three years old next spring, they averaged me nearly one and one-half baskets per tree, netting me over one dollar per tree or $200 per acre and only two and one-half years from planting.

I am getting more fully convinced every year there is no such thing as an off year in any of our fruits where proper attention is given. I know this is contrary to public opinion, but I cannot help it. I have not had an off year for ten years.

R. L. WATTS,
Chairman of General Fruit Committee.

DISCUSSION.

MR. HIESTER.—I am pleased to hear that Ben Davis is not being so largely planted as formerly where conditions are favorable. York Imperial is a money maker, but it must have York Imperial ground. I have seen it grown on bottom lands where it was tough and hard and only sold for third rate fruit.

PROF. BUTZ.—As a preventative of borers I have heard of a resinous sticky material resembling flypaper. It is recommended by the Experiment Station of Michigan.

PROF. SURFACE.—In my opinion it is made of resin and oil, and I think anyone can prepare it.

MR. BROWN, Del.—I am glad to commend the able report of General Fruit Committee which has just been read. It is one of the most valuable and interesting papers I have heard for some years. Some seven years ago I had the pleasure of hearing a similar report by Mr. Snavely, of Lebanon county, which was also a most interesting and able paper. As to Stayman Winesap, I consider it one of the coming apples. The fruit is beautiful, the tree a good grower and heavy bearer, and I grow it more largely than anything else. I saw it grow in Dr. Funk's orchard some time ago, and I believe it will do well in any part of the State. I saw the Doctor's peach orchard also, and I consider it the finest and most vigorous I ever saw.

MR. CHASE.—I have some specimens on the table from trees five years old, and they have not missed a crop in that time. On one side of Stayman are York Imperial, and on the other, Baldwin and Northern Spy, and Stayman has yielded more than any other variety. It promises to succeed over as large a territory as Baldwin or Stark.

One question of much importance is, the matter of fruit storage. I would like to hear the experience of some of our members.

MR. HIESTER.—I have no storage house of my own, and my only experience is in renting space in regular storage houses, where the temperature can be kept so as not to vary one degree. It costs ten cents a month per barrel, which is cheaper for me than to build a storage warehouse. I have recommended that where possible, farmers and fruit growers go together and build on the co-operative or partnership plan. I saw houses of that kind in New York State, and the contents were in splendid condition.

Prof. Butz, chairman, Committee on Fruit Packages submitted the following report:

To the Members of the State Horticultural Association of Pennsylvania:

Gentlemen—Your committee recommends the adoption of the following fruit packages for the shipment of the several fruits named.

For Apples.—The standard 28 stave, 3 bushel barrel.

For Summer Fancy Varieties.—The stave bushel basket.

For Winter Fancy Varieties.—The bushel box, 10x11x20 inches.

For Pears.—The barrel and half barrel. Fancy varieties in half bushel stave peach baskets.

For Peaches.—The half bushel stave peach basket. For fancy varieties, the twenty pound basket with raised ventilated cover, and 6 basket carrier.

For Plums.—Ten and twenty pound baskets, with raised ventilated cover.

For Grapes.—The four and eight pound basket.

For Small Fruits and Cherries.—The bushel crate of 32 quart boxes, non-returnable.

Respectfully submitted by the

GEO. C. BUTZ,
GABRIEL HIESTER,
EARL PETERS.

Committee.

MR. HIESTER.—At a meeting which I attended in New York State last week, I saw some packages on exhibit to show different methods. It will pay any one who has fancy fruit, to put it up in good shape. In the fall, in the midst of the picking season it requires too much time.

The CHAIRMAN.—I think Mr. Hiester's idea is correct. In Monroe county I have natural cold storage, and fruit as picked is put in large bins. In December or January we pack fancy fruit in boxes, and second grade fruit is sold in bulk.

MR. BROWN.—Repacking of fruit is quite a good idea, but commission merchants generally do not want it, as they prefer to repack themselves. There is a growing trade for fruit in small packages in all our cities, especially the fancy grades. Many persons cannot buy in large quantities, but the general trade could not be handled in small packages.

In shipping apples in Delaware, we use a bushel basket built like a peach basket. They can be packed readily and fruit can be seen.

The following communication from the secretary of "Mississippi Valley Apple Growers Association was read:

Quincy, Ill., Jan. 6, 1905.

To the Officers and Members of State Horticultural Association of Pennsylvania:

Gentlemen: Availing myself of an opportunity to extend cordial greetings and best wishes for a successful meeting, may I ask the

privilege of placing a matter, which many think is of the utmost importance, for your courteous consideration?

It has been generally conceded that the Apple Day feature at the World's Fair last year was highly beneficial to all who had the remotest interest in the apple industry. There is a pronounced sentiment in the middle west of making Apple Day one of the annual events to be generally observed all over the United States.

It has been thought that the date should come in about the middle of each October in order to come closely in touch with the late fall and winter apples and I have not heard of a single objection anywhere against Oct. 17. It is not the purpose to create a holiday nor to form any plan for making assessments or soliciting contributions, the idea being, to allow each national, state and local society to observe the day as they may deem best and proper.

You are well aware that in the month of October the farmers institutes, county fairs and horticultural exhibitions are quite common all over the land and such organizations could easily make a display of apples. Knowing that such a day was to be generally observed you can readily see that there would be a commendable rivalry between societies for making creditable exhibits and also among individuals in showing superior specimens. This would cause a wholesome stimulus in efforts for improving fruit. It can be readily anticipated that there would be a general diet of apples on such a day and this would make a tremendous demand upon all having supplies. It would naturally cause many interesting comments of the public press and would be a powerful means of keeping the apple prominently before the people.

The average orchardist will perceive the necessity for such a movement. There will be some places where there may be no production of crops and growers in such a vicinity would gladly hail any movement to help sell their fruit. It of course would follow that it would give a profitable awakening to buyers and shippers. What is respectfully asked of your association is to give a moral support to the movement by adopting a resolution which would carry your sanction.

Hoping that you will look upon the matter favorably, I am, with best regards.

Yours truly,

JAMES HANDLY,

Secretary.

On motion of Mr. Hiester the communication was referred to the Executive Committee.

MR. HIESTER.—Referring again to my attendance at the Horticulture meeting in in New York State last week, I want to say that I concluded that in New York they are far in advance of us in Horticultural methods. One exhibit, showing the results of spraying potatoes interested me greatly, and was one of the greatest features of the meeting. The results of spraying for "Leaf Curl" and "Brown rot" were also important object lessons. It was found that when San José Scale was controlled by applications of lime, sulphur and salt, Leaf Curl and Brown Rot were also kept in control. I saw Pennsylvania apples there grown in the Experiment grounds, and

"Smokehouse" were nearly as good and well grown as in their native state. As grown there, they find it almost a winter apple. We want in this State a bureau of information that will advise us to best soils and altitudes for different fruits, and what varieties are adopted to certain localities. The possibilities and conditions of our State are not fully understood and can be studied to great advantage. As to varieties a Canadian fruit grower stated at the same meeting, that in their province growers were restricted to six or eight varieties, and at their fruit exhibits no premiums were given for more than ten varieties of apples. Their idea is that quality should be the keynote, rather than quantity. In Pennsylvania, in addition to the question of production we should also study that of distribution. Let our society discuss the larger questions of business when we meet but once a year.

PROF. WATTS.—I am much impressed with the remarks just made, and agree that our meetings should be more business like, and larger displays of fruit should be encouraged. Raspberries, blackberries and other small fruits should have more consideration.

MR. SCHOLL.—Objected to the usual method of reporting our fruit exhibits by the committee, and contended that more attention is given thereto.

On motion of Mr. Peters the chair was authorized to appoint a committee of three to examine new fruits on exhibition and report upon the same.

MR. BLACK (New Jersey), inquired whether this organization pays any premiums on exhibits of fruits and stated that in his state $2.00 is paid for finest display. You have here a nice display, but in our exhibits we allow no one to exhibit less than four or five specimens. As an inducement for the displays of fruit there is nothing like giving a man a dollar or two for a choice display. The New Jersey Society receives $300 per year from the State.

MR. BRIDGES.—I would like to have some information concerning Jonathan apple. I am interested in fruit culture on the South mountain, and would like to know what are the best varieties for that location. We want to plant what will pay best. We have York Imperial, Gano, Stark, and would ask what are other promising varieties.

MR. CREASY.—Jonathan is considered the standard of excellence. I have been trying to grow it, and find it can be grown to perfection on deep soil.

MR. MILLER.—Have grown Jonathan and they did well for a while, then dwindled away and were of no value.

MR. BROWN.—Jonathan will grow on almost any altitude high or low. It has character and quality and with Spitzenburg, may be considered among the best. It wants cultivation and attention, and needs spraying and thinning. I consider it one of our most profitable varieties.

MR. WERTZ.—Will Mr. Brown give his method of preparing his lime, sulphur and salt mixture for spraying? Have read about it and would like to have further particulars.

MR. BROWN.—My experience of mixing lime, sulphur and salt without boiling has been that it is equally as effective as the boiled wash. I first employed this method in 1903, and was followed in

1904 by others, who report success. When I started using lime, sulphur and salt four years ago, I used it according to the California method, boiling it one and a half hours, using the full formula, 40 pounds of lime, 20 pounds of sulphur, 15 pounds of salt and 60 gallons of water. We have a rigid law in Delaware, making spraying practically compulsory. Our first infestations of scale are traced as coming to us from New Jersey. Owing to the generally bad effect of oil, I was led to use the less dangerous but more effective wash, lime, sulphur and salt. The first two years I used it, as already stated according to the California method. This being so laborious and slow, and in view of the fact that good lime when slacking generates a heat of about 300 degrees, I conceived the idea of making this wash by allowing the lime to cook it, and I proceeded in the following manner.

I took 20 pounds of pure sulphur, put it into a vessel, poured over it a little at a time, 2 gallons of boiling water, stirring well all the time, this gave me an excellent sulphur paste. I then took a barrel that would hold 60 gallons, put into it 40 pounds of the very best stone lime obtainable, onto this lime I poured 12 gallons of boiling water, I immediately added the sulphur paste previously prepared, covered the barrel quickly with a double burlap sack, and left this mass cook for 25 minutes, occasionally stirring it a little with an old hoe, but not sufficient to intercept the boiling. When boiling ceases I fill up with warm water the required 60 gallons, then add the 15 pounds of salt, stir well, strain well into spray tank and supply when fresh and hot to obtain best results. If this has been properly made it should stick on the tree when it strikes it like good paint, when it runs like water it is no good and had better be thrown away. I have added the caustic potash to continue the boiling and do not believe it is any benefit but rather an injury as it will under certain conditions precipitate the lime, as you will always find a larger residue of lime where a barrel of the wash is sprayed out when caustic potash has been used, than where it has been left out.

My use of lime, sulphur and salt has been extremely satisfactory, although I have not been able to fully eradicate it on six Stark apple trees 25 years old. I believe this wholly due, however, to the hairy character of the outermost tips of apple branches upon which it is extremely difficult to get the lime, sulphur coat to stick.

This wash is a sovereign remedy, and as good a fungicide as it is an insecticide, thus performing two offices at one application.

Its use is not attended with any danger whatever, while great care must be exercised in the use of oil.

I have been very successful in my method of preparing this wash, and hundreds of growers who have followed this plan in 1904 have been equally successful. In inexperienced or indifferent hands I would recommend boiling the wash, but in methodical, careful hands, much time and expense can be saved by following my method.

DR. KOONS.—What is the difference in kind of sulphur used?

MR. BROWN.—Sublimed sulphur is supposed to contain more acidity. As to how long this wash will stick would say that applications made in March last, can still be distinctly seen. It might be washed off by a severe east wind if it came soon after the application was made.

Adjourned.

ADDRESS OF THE PRESIDENT.

Evening Session.

To the Members of the State Horticultural Association of Pennsylvania:

During the years that I have been honored as your President, it has been a matter of regret to me that I was not in a position to accomplish more for the horticultural interests of our State.

When I accepted the Presidency, it was my ambition to inaugurate a movement for the formation of County Horticultural Associations, the same to be auxiliary to our State Association. I, however, found myself unable to give the necessary time to the undertaking, and left it for those following after me.

It is to be regretted that this, the State Horticultural Association, is not more closely in touch with the fruit growers and horticulturists of the Commonwealth, and that our membership has not extended into every county of the State.

I understand that the Department of Agriculture, through its Economic Zoologist, Professor Surface, has availed itself of every opportunity to call the attention of the fruit growers to the State Association, but the response in the way of increased membership, although encouraging, has not been what we had hoped for.

Unfortunately, the proceedings of our meetings and the many valuable papers read at the same cannot under the present system be promptly published and distributed among the members. Could this be done, I am of the opinion that much good would result.

Also, it is to be regretted that there cannot be an annual exhibit of Pennsylvania fruits; this in a manner to encourage our fruit growers and educating our people as to the most desirable varieties and the best methods of raising the same.

Should the Legislature make an appropriation for this purpose, it would be money well invested.

Some view with alarm the growing tendency to ask State aid by the many civic and industrial associations, but I see in this tendency nothing at which to be alarmed. Paternalism however exercised has no terrors for me.

We read that the Lord helps those who help themselves, and under existing conditions, I think the State should in many ways render assistance to those who are endeavoring to help themselves.

I will go further. I contend that under its police powers, it is the duty of the State to protect as far as may be practicable the careful and enterprising farmer from his slovenly and careless neighbor.

In the early history of the State, the farmer would make his little clearing, erect his cabin, and sow the seed for his future orchard. As these trees would come into bearing, he would find that some would yield satisfactory fruit, while in other cases, the fruit would be worthless, except for cider.

Then came the itinerant tree grafter who would top graft the worthless trees to improved varieties. During this time there was

little or no commercial orcharding for the reason that the cost of transportation was prohibitive.

Also, during that time, insect pests and diseases with which we are now confronted, were practically unknown.

Now with modern transportation facilities large orchards have been established, and under existing conditions every man who establishes such a commercial orchard is to a greater or less degree threatened with serious injury by the negligence of his neighbors who will allow the pernicious scale and other insect pests and diseases to remain unchecked upon his trees and hedge rows.

Where such conditions exist, I contend that by right the authorities should intervene to afford protection from such menace.

I would not elaborate upon this point by citing the numerous statutes under which the authorities of the State are now fully authorized to protect life and property, and to stamp out the diseases that are a menace to live stock and to health.

Some may contend that inasmuch as the orchardist is growing fruit for profit, he should protect himself, but let us realize that the more favorable the conditions, the more easily can fruit be grown, and that the natural increase in the supply will make fruit more plentiful and cheaper for the average consumer, and that while the fruit growers may number thousands, the consumers number tens of thousands.

It is a lamentable fact that to-day Pennsylvania with its diversified soils and climates is largely dependent upon its sister States for its supply of fruits. I will not tire you with the figures of the supply of other States in comparison with Pennsylvania, but when the day arrives, as it will eventually arrive, when Pennsylvania grows all of the apples, pears, peaches and small fruits that its people can consume with a liberal margin for exporting, there will be a marked increase in the wealth of the State in its revenues, and last but not least, there will be an improvement in the health and contentment of its people.

Although our Association during the 46 years of its existence has accomplished much for the horticultural interests of the State, it is not reasonable to expect a civic organization of this character without State aid to accomplish all that could be desired.

In view of this, I am heartily in favor of the creation of a Division of Horticulture in connection with the Department of Agriculture, the same to be under the administration of a practical horticulturist, who shall be paid a salary sufficient to justify his devoting his entire time and attention to the horticultural interests of the State.

I am in favor of appropriating to such a horticultural division a sufficient amount to inaugurate and maintain a systematic and effective educational work.

Simply as a business proposition, I contend that every dollar invested by the State in this direction will be returned to the State ten-fold; yes, an hundred-fold.

I would have the work of this Department confined not only simply to the encouragement of the development of our fruit interests but to the adornment of our yards and laws. It is not surprising that the average farmer feels that he has neither the time nor the

means to do much in the direction of floral decorations about his place, and yet in the majority of cases on his own farm and along the road side can be found beautiful and desirable native flowers, shrubs, and vines, which can easily and quickly be dug and transplanted, and so arranged as to make the bare forlorn corners and edges of his front yard very attractive to the eye. A little work in this direction and possibly a little money expended on varieties that do not grow in his neighborhood would very quickly make his place worth more to sell, and vastly more to keep.

"HOW SAN JOSE SCALE TRAVELS."

HISTORICAL.

In 1887 the writer began to plant fruit trees on the south side of Lewisburg. In the same year, Mr. G. Wolfe planted on the west of the town, in the village of Linntown. In 1893, the trees and plants on both our properties were dying from San José Scale. They were infested sometime prior to 1893. My property is immediately adjoining Lewisburg. Mr. Wolfe's is one-fourth mile to the west. Until 1902, the scale was not perceptible in my end of town. It has not yet appeared in west end, and Mr. Wolfe tells me that none of his neighbors have as yet complained of the Scale. South of my property, within a half mile are three orchards. Scale was observed two years ago in one of these, but upon newly planted plum trees. The nearest orchard to mine is about 300 yards and is not yet infested. Across the river one-half mile is an orchard infested, though young trees. In Germantown, Pa., the scale is known to have traveled one mile since 1896. In the writers observation the scale travels with extreme slowness, after being once planted in an orchard.

HOW IT TRAVELS.

It walks for a few days after birth and at a rapid rate for so small a creature. In Central Pennsylvania it can be seen moving first about June 15th, and from that time, so long as there are warm days, even until in November. It certainly walks to adjoining trees where branches interlace, and so spreads rapidly. It also spreads in this way rapidly in nursery rows.

Given an infested tree, it spreads in an orchard, very slowly, to the trees immediately adjacent, and so passes in time over the orchard. It would seem that it can sometimes get from tree to tree over the ground, for in young trees, it is especially at first found upon the trunks of the trees, and upon the under branches. To illustrate its slow movement from tree to tree, in 1900, in a row of trees on the writer's property, two trees were infested, and the scale be-

gan to travel along the row. Now, although the branches interlace, the scale has not yet reached the ninth tree, which is to-day free from the scale.

The wind may possibly sometimes waft it to nearby plants. Possibly it travels on ants, or other small insects. Some have been quite sure it is conveyed upon the horse used in working orchards, but this does not seem to the writer probable. Birds, and especially the English sparrow, have been credited with spreading the scale. If this is so, then it would seem that it makes use of birds, as a vehicle, as little as possible, and against the bird conveying theory, we would urge, first, it is commonly found upon the under branches of a tree first, in a word in the places where birds would be least likely to alight. Second, The scale selects its host, or plant on which it will live. If careful to do this, is it not also careful to select the vehicle by which it travels? We think so. Thus it avoids the cherry, the Kieffer pear, and forest trees generally, while it selects for its home the currant bush, Japan plum, Japan quince, Ben Davis apple, Seckle and Aujou pears, and the Rosaceae family generally, though there are exceptions.

But if we do not know how it gets from tree to tree, we do know how it has been spread over the State. It came to the writer's property on nursery stock, and it has been carried all over the State in the same manner. All know that this was true in the past. It is still true. During the past summer the writer visited three nurseries in this State, all recently infested from purchased stock, one from Maryland, one from Iowa, and one from New York. In all cases our nurserymen thought they were getting clean stock, and for a time, at least, they disseminated infested stock, not knowing that they had the scale.

There are still dealers in trees who do not believe the scale to be really dangerous. Such do not hesitate to sell infested trees whereever they can. There are others who place the burden upon the State, claiming that after they receive a certificate of freedom from scale, they are free to sell, without further concern, even though the scale may be afterward found upon their stock.

The scale is nearly miscrocopic in size. It may escape a hasty inspection and a careless fumigation. It does so escape. The fact is, that to-day after all that has been written and done,scale in large quantity is being disseminated on young stock, and will be so disseminated until greater care is taken with both inspections and fumigations. Dealers need much fuller instructions upon fumigation, and it is a question whether or not all fumigation should not be done under State inspection.

Another matter that should receive attention. A nursery once infested should ever after be required to fumigate all its stock, or such stock as the insect inhabits. So difficult is it to find the minute insect, that this precaution is a necessity.

Inspections should also be delayed so far as possible until after the leaves have fallen, for it is well nigh impossible to do good work with the trees covered with their foliage. It is the opinion that so far as farms are concerned, the scale cannot spread from orchard to orchard, and that an infested orchard is no great menace to the neighboring farm. In villages it is different. There the scale may pass from lot to lot, though generally but slowly.

THE FOREST IN ITS RELATION TO HORTICULTURE.

By I. C. Williams, Deputy Commissioner of Forestry, Harrisburg, Pa.

The relationship existing between forestry and horticulture may or may not be near or intimate. The effect of the forest upon what the horticulturist concerns himself with may not be apparent to the casual observer; but such relation is no doubt real. This effort, therefore, will be directed toward showing how and why it exists, the benefit to be derived by one from the other, together with some suggestions which it is believed would be well for the Association to consider.

One of the very important uses of the forest is the conservation of moisture. A treeless region is a dry country, sometimes arid and sandy. A dense forest cover shades the ground, and prevents the effect of the direct action of sunlight, rapid evaporation. The forest floor, if protected from fire, will soon be covered with a thick mulch. The roots of the trees, penetrating deeply, form bonds to knit the soil together, as well as water conductors to carry surplus rain beneath the surface. The mulch receives water and holds it as a sponge, prevents rapid flow-off, and covers the forest floor as a wet blanket. In a treeless region the rains beat the soil, from the top of which the water rushes, usually carrying a considerable part of the soil therewith, the streams and rivers are gorged with water, following which is the usual destruction of bridges and fences, inundation of lowlands, and deposition of silt, gravel, and other debris upon valuable meadow lands. What does not thus flow off quickly evaporates, and is dispersed by the winds. Without the great natural reservoir, the forest, the water is speedily gone, dryness follows with its inevitable injury to vegetation.

With the forest cover intact, a small part of the falling rain is immediately returned to the air by evaporation from leaves and branches, some is absorbed, a part descends trunks and following the line of roots reaches deep underground strata, while the remainder is held by the mulch and slowly allowed to sink below the surface. Very little of the rainfall thus runs directly off. As a result of the above, springs are steadily fed, a moderately even flow is maintained, no unusually high water stages are followed by unusually low stages. While the rain may descend never so hard, a stream flowing from a well wooded region is seldom if ever colored by the washing of soil.

Among the functions of the leafy part of the forest is the exhalation of watery vapor into the atmosphere. It has been calculated, from experiments, that a square mile of average forest will exhale three and a third millions gallons of water in a month, or one hundred and ten thousand gallons a day, being two thousand barrels of fifty-five gallons each. This is no inconsiderable amount.

In seasons of more than average dryness an amount of vapor such as the above, added each day to the atmosphere, must have a beneficial effect upon all forms of smaller vegetation, for descending at

night in the form of dew, it furnishes a considerable part of the moisture necessary for ordinary growth.

It is maintained by some that the presence of large wooded areas is conducive to rainfall. The investigation of this question has not yet yielded satisfactory results. It is certain that the forest does in no way check the volume of rainfall. It is held by many that when the great volume of watery vapor rises into the atmosphere to the cloud forming strata of air, it is, under favorable conditions, but a step to the point of complete saturation and precipitation.

The forest is a soil former and in this way may be of value to the horticulturist. The roots bring up from the depths of the earth mineral plant foods which find their way back to the surface of the earth in the form of twigs and leaves, there to decay and form the valuable humus or mulch, found in every protected forest. A small wooded area will furnish many hundred loads of rich forest soil which may be used by the Horticulturist on thin or well worn soils with the best results, as well as employed for the lightening, sweetening, and general improvement of heavy soils. So well known is the forest as a soil former that on the continent of Europe worn out areas are planted with quick growing trees. At the end of thirty years the trees are marketed and the soil is found to have regained its former vigor and excellence, now ready for the intensive farming which characterizes those thickly populated countries.

In some localities vegetation suffers greatly by reason of the intensity of storms and prevailing winds. Horticulture under these conditions must of necessity suffer severely. The wind bloweth where it listeth but its force can be diminished and consequent destruction of small fruits and tender vegetables decreased by the planting of suitable trees to act as a wind shield or screen. Nothing better of the kind exists than a nearby wood heavily timbered, interspersed with hemlocks, firs, and other low spreading coniferous trees. It is the experience of many fruit growers that among the most dangerous obstacles to their business are the violent storms likely to occur at times of greatest disadvantage and without warning. A more generous forest planting, or an adaption of lands for horticultural purposes well situated with respect to forested areas could not be other than helpful.

In localities where the soil is light, thin, and disposed to be sandy, another obstacle to the art of the horticulturist is dust storms and the shifting of soil by means of the wind. With the force of the wind broken by the intervening forest, the dust and sand deposited within, or on the windward side of the wooded land, the forest takes the place of a great filter, allowing clean air to emerge and preventing flowers, fruit, leaves, the sensitive organs of orchard and garden plants, from being choked with dust, sapping their vitality by the absorption of watery juices, to their most certain injury, rendering such fruit unfit for the market, and destroying hopes of profitable return to the owner.

Another benefit which, it is believed, the forest confers upon the horticulturist is its probable effect of retarding early frost. It is a well known fact that a cloudy night at the beginning of the frost season means freedom from frost for that night. The orange growers of Florida and the grape growers of central New York

build great smoke or smudge fires, covering their orchards and vineyards with a blanket of smoke, preventing the radiation of heat, consequently removing danger of frost. Over an extended forested area, interspersed with farms and gardens, much the same effect can be produced. The watery exhalation from the forest, hereinbefore spoken of, condensing overhead into the form of low hanging clouds, acts in the same way as the smoke blanket, or a general cloud covering. Of course no such effect could result from forests of diminished size or ordinary woodland.

The horticulturist, along with all other enjoys many common advantages or benefits of the forest. The question of irrigation is one that does not confront the Pennsylvania fruit grower, but it is a most vital question with his brother in California and other arid regions of the west. Without the forest to conserve the snow and rainfall, there could be little hope for extending the benefits of irrigation.

Such being the benefits conferred upon horticulture by the forest, we look in vain for benefits to the forest conferred by the practice of horticulture. In other words, the two do not stand in a reciprocal relation. It is wholly a one-sided matter; but the horticulturist can, indeed, lend his influence toward the protection and preservation of the forest. He can, in the first place, refrain from destroying it, should he happen to be the owner of any considerable forest area. He can protect it from fire and spoliation, and insist that others do the same. He can extol the virtues of the forest. He can educate himself and his children to look upon it as a great natural inheritance, "to be wisely used, reverently honored, and carefully maintained."

MR. CREASY.—This is a subject in which I am much interested, and will be one of the great questions of the future. The subject of rebates is one that has not been fully met. In sparsely settled townships and counties in which are large tracts of forest, money is needed for roads and schools, and where rebates are granted the amount must be made up on other property. In our county the great danger to forests from fires started by railroads, and if therewere some way to compel these corporations to assist in extinguishing them, a great step would be gained.

MR. McSPARREN.—In justice to one of our railroads, I would state that it is very careful to keep its right of way clear of anything that might cause fires. They have track walkers who act as wardens.

MR. PETERS.—In Southern Pennsylvania there are thousands of acres of forest almost covered with undergrowth, and have been almost bare of trees for 25 years. Nearly every year these forests are set on fire by freight trains, and nothing is said about it. It has been suggested that owners of large forest tracts be compelled to divided them into sections, and open avenues through them, so as to facilitate the handling of fires. I think twenty-five or fifty dollars paid annually to a conscientious man would guard or protect 5,000 acres.

DR. GROFF.—Mr. Peters' views in many particulars correspond with my own. If we could imprison the men who start fires it would be a great gain. In addition to the causes of fires already mentioned, the material left in the forests by lumbermen is a very

important factor. As to the system of rebates allowed by law, it is not so much unconstitutional as impracticable. The deficiencies occasioned by such rebates must be met by additional taxes on other property. This work of replenishing our forests has just been begun, and is one of our most important problems.

MR. STOUT.—My county is covered with immense areas of forest and no attention is paid to the extinguishing of fires.

MR. BRIDGES.—No one is more interested than we who are engaged in fruit culture and have large fruit interests.

MR. WILLIAMS.—I am delighted to hear this discussion, and am pleased to see the interest that is manifested in the forestry question.

I have been convinced that constables as a rule are inefficient fire wardens and are not to be depended upon. I know that one half of our forest fires are started by railroad engines. The remedy lies with the Legislature, and if the people will pay the bill, the Department will see that the fire question is met by putting a man on every square mile of forest. The Governor's message recommended that for a distance of 100 feet on each side of the tracks, railroad companies should be required to extinguish all fires. We have about fifty men for 600,000 acres, a force manifestly inadequate.

MR. CHASE.—I think that no one present is more heavily taxed or harder hit by forest fires than the president of this association. We have many fires in my district in the north eastern part of the State, and the section hands are not as careful as they should be. A large per cent. of the people there depend upon the huckleberry crop, and it is their object to burn over our forests about every three years. Over and above all we must try to educate our people that it is their interest to protect our forests.

On motion of Mr. Creasy, the chair was authorized to appoint a committee of three to draft some plan of procedure to present to the Legislature in reference to this question.

Messrs Creasy, McSparran and Chase were appointed.

The following committees were announced:

Deceased Members.

W. H. Moon, S. Morris Jones, James Krewson.

Legislation and Allied Organizations.

Gabriel Hiester, Chairman; Earl Peters, John G. Rush, H. A. Surface, Howard A. Chase, Enos B. Engle.

The following paper was read by Hon. W. T. Creasy, Catawissa, Pa.:

SHOULD QUALITY OR QUANTITY BE OUR AIM?

More than fifty years ago the author of Barry's Fruit Garden said: "The fine fruits that were formerly considered as luxuries only for the tables of the wealthy are beginning to take their place among

the ordinary supplies of every man's table; and this taste must grow from year to year, with an increased supply." The family that consumes a bushel of good fruit this year will want a larger quantity next year. Since it, would appear that both quantity and quality should be our aim, and in the great desire to secure quantity we let go of quality, and by having poor quality we need not so much quantity, so of the two I prefer quality and so do you, at least for our use. But when we produce fruit for sale we often think the people want nothing but quantity when in reality with a little education they also want quality. Then what is the effect? The fruit with quality will sell while the poor fruit must waste, and is this not about the condition of affairs we have arrived at in the fruit business in this state, as well as in the United States?

I believe the planting of fruit is being overdone, and those who have planted varieties for quantity only will find no market for their fruit, at least not at profitable prices. A few years ago fall and winter pears of the varieties of high quality brought good prices, but the large planting of the Kieffer drove out quality, and to-day we are awakening to the fact that the Kieffer pear is selling for little or nothing and I will venture the prophecy that in a few years people will again pay the price for quality. The Kieffer pear has often been compared to a potato for quality. While I will not affirm or deny that its quality is poorer, I do say that the price is less than that of potatoes. I question very much whether the per capita consumption of pears to-day is as great as it was ten or twelve years ago, when there was a larger per cent. of better pears in the market.

In our section of the State we had a big apple crop and thousands of bushels went to waste, principally from two causes: First, there seemed to be no co-operation among the growers to dispose of their crop; and, secondly, many were of such poor quality that the only way to get shut of them was to let them rot on and under the trees. I disposed of a car-load of Baldwins to a customer in Nebraska, and the principal reason why I could sell them to a customer so far away was because they were not Ben Davis. I met one of this man's employes a few days ago and asked him whether they had no apples in the West and he said, "We have Ben Davis, but our customers know that apple too well and would rather have none than that." I asked him how about the York State apples, and he replied, "They are too green, while yours are nicely colored, and carefully packed."

The apple market has been more or less demoralized this season and it is quantity and not quality that has made the business unprofitable. A great deal of money can be saved and made by digging up fruit trees and plants bearing worthless fruits.

Another general cause of poor prices is our carelessness in culture and getting our fruit on the market. The greatly increased cost of labor there must come a revolution in the fruit business and I know of no better time to begin than now. The future will demand quality, and if we wish to stay in the business we must accede to these demands by planting better varieties with better cultivation and better methods of disposing of our fruit after it is grown.

In a fruit garden quality is still more desirable than in a commercial orchard, for here it is that we intend to take our own medicine. How much we are disgusted even with ourselves when we come to

eat fruit from our own garden that lacks quality. One bunch of good grapes is worth a bushel of sour ones. It is in these gardens that the happiest days of man's life are spent, be he rich or poor, merchant or mechanic. No farmer or laborer can look upon a fine fruit garden but to be filled with the highest emotions of the true, the beautiful and the good. But alas, my dear friend, should you be so unfortunate as not to possess that beautiful fruit garden, and perchance your neighbor does, and should you take a sly peep over his garden wall and behold a Ben Davis apple or a Kieffer pear, would you not keep the Commandment "Thou shalt not steal," and pray the Lord to have mercy on the man that planted them and the nurseryman that grew them.

MR. PETERS.—We frequently receive at our office some such statement as has been made in the paper just read. Still, there are certain people who will plant Ben Davis apple and Kieffer pear tree, and I know parties who say that Ben Davis is the best culinary apple grown. Mr. Brown can tell you something about Kieffer pears that will surprise you. It costs less to grow them than potatoes and they are not easily killed by San José Scale. I can deceive one third of the members of this association on canned Kieffers, and we want some reasons for denouncing varieties of fruit that are so popular with the masses. If I had 1,000 Ben Davis apple trees I would not change them.

MR. MOON.—I did not know there was so much room for missionary work in Mr. Peters' county.

MR. PETERS.—One of the most convincing arguments is our apple buyers who offer 25 to 50 cents per bushel more for them than for other kinds.

MR. CHASE.—There is no question that Ben Davis and York Imperial will sell, but the dissemination of such varieties must have a tendency to decrease the demand for apples.

PROF. WATTS.—Judging by reports sent to chairman of General Fruit Committee, York Imperial is losing ground. One year ago it stood first on the list of desirable apples in this State. Now it is second.

MR. HIESTER.—It seems to me this only emphasizes what has been on my mind for years. There are locations in Pennsylvania where Ben Davis and Gano can be grown as well as any where else. My object in fruit growing is to make money, but I always try to sell a man something that will induce him to patronize me again.

MR. BROWN.—Mr. Hiester ought to come to Delaware, where we net $150 dollars per acre for Kieffer pears. While I am in hearty accord with Mr. Creasy's paper, at the same time I grow things for money. There are two classes of customers. We have an educated, wealthy class that wants the best that can be had, and Horticulturists must plant for that class. Then we have a laboring class in all communities that will buy an article because it is cheap. My Kieffer orchard is the oldest in Delaware. I have improved their quality by cultivation, fertilization and thorough spraying. The Kieffer has no equal as a preserving pear. It has a quince flavor peculiar to itself when put into glass. The tree is hardier and more productive than any other. As for Ben Davis, it has brought more dollars to American apple growers than any other apple, but I

would not want it for myself when I can get Stayman, Jonathan or Rome Beauty. Last year 85 per cent. of my crop was absolutely perfect.

PROF. WATTS.—What are the claims made for Stayman?

MR. BROWN.—Trees bear younger than York Imperial, and ripen a larger per cent. of good apples. It is decidedly more profitable than Rome Beauty. We also have an apple called Nero, and the tree at 18 years old yielded 44⅝ bushel baskets of fruit which sold for more in Philadelphia, than New York Baldwins. It bears every year and is beautiful and uniform in color and size.

MR. REED.—I find that Kieffer on heavy soil will yield large fruit of poor color and quality. On sandy soil it is usually of good color and quality.

Adjourned.

Wednesday, 9.30 A. M.

Having been called to order by the President, the treasurer's statement was read showing a balance of $8.60 on hand.

The following letter was read by the secretary.

January 17, 1905.

Mr. Enos B. Engle, Secretary of State Horticultural Society, Harrisburg, Pa.:

My Dear Sir: I beg to acknowledge the receipt of your notice of the meeting of the State Horticultural Society, which meeting it was my purpose to attend. I am sorry to say, however, that a wire message from my home, announcing the death of one of my closest friends calls me away, and will make it impossible for me to be with you. Hoping that you may have a very pleasant and successful meeting, I am,

Very truly yours,
N. B. CRITCHFIELD,
Secretary of Agriculture.

Prof. H. A. Surface and Gabriel Hiester were appointed a committee to wait upon Governor Pennypacker, and invite him to the meetings.

Mr. Cooper, chairman of Committee on Nominations, submitted the following list of officers for 1905.

President.—Gabriel Hiester, Harrisburg.

Vice Presidents.—Hon. W. T. Creasy, Catawissa; Thos. B. Meehan, Germantown; Dr. J. H. Funk, Boyertown.

Recording Secretary.—Enos B. Engle, Waynesboro.

Corresponding Secretary.—Wm. P. Brinton, Christiana.

Treasurer.—Edwin W. Thomas, King of Prussia.

Mr. Cooper was authorized to cast the ballot of the association and the aforenamed were declared elected.

The selection of a place for next annual meeting was taken up.

Mr. McSparran named Lancaster.

MR. PETERS.—While we were well treated, and had an excellent meeting at Lancaster, we met there only a year ago, and I extend an invitation to come to Gettysburg. I invite you in behalf of our Adams County Fruit Growers, who will be glad to have you come

there. We have a Fruit Growers Association of some 40 members in our county all growing leading varieties. You will also be able to learn something of conditions existing there.

Gettysburg too is historic ground and extends the hand of welcome. Mr. McSparran withdrew his nomination of Lancaster, and Gettysburg was unanimously chosen.

The following paper was read by W. H. Stout, Pine Grove, Pa.

THEORY vs. PRACTICE.

If we go back in imagination to that remote period when the human race had evolved to a more intelligent and reasonable creature than brute creation; in the wilds of the world, upon his own resources, among other animals, and increasing numbers of his race, the struggle for existence intensified, by increasing population when sheltering places in hollow trees, caves, and caverns were all preempted and occupied. The theory of constructing sheltering tents for protection suggested methods not then in practice. The theory has been improved with the advance of civilization from the rude tent of leaves, bark or skins to this period of sky scrapers. Inexperienced, untrained and uneducated subsisting upon the products of nature, dieting upon roots, herbs and wild fruits as vegetables, and upon turtles, snakes, snails, fish and such small game as the first instrument in use—a wooden club—supplied him with meat, until the easy available supply became exhausted, when improved methods—a necessity—the theory of using stone axes, hammers, and spears, the bow and arrow with pointed flint, ushered in the stone, to succeed the wooden age. Ambition, envy, rivalry, fueds and conflicts, were settled by combat between individuals and tribes and the theory of conquest and possession through practice became the law. Theory suggested hollow logs as suitable vessels for navigation and fishing, and the wind driving the craft, suggested something to catch the breeze as a propeller.

An unfortunate animal or a nutbearing bush overwhelmed with hotlava from a volcano, or by fires kindled by lightning's flash, roasted the food which was found superior to that in it uncooked condition that the theory of cooking and the use of fire in domestic economy became a practice and when not otherwise obtainable fire was kindled by friction, until the iron age introduced the flint and steel, science the friction match, and the electrical appliances so common in our time. It is only 400 years since this country possessed by red men was discovered and found the natives in the same condition as was Europe earlier while Egypt and Asia had advanced to the bronze age, while iron was not in use until at a later period.

Ignorant people ridicule theory and when scientific persons appear before them as instructors, they are looked upon as imposters, while in their daily pursuits the same persons who speak flippantly of science, make use of theories conceived and put into practice long

ago. Before Gallileo's time, "the morning stars sang together for joy," the planets were guided by cellestial hands, and lightning was the angel of the Lord. In this early period theory was a dangerous thing to the theorist, but navigation owes its success to the once ridiculed science of astronomy, and agriculture to the theory of cross-fertilization, and the animal industry to the careful study of biology by Darwin. When in 1752 Franklin, accompanied by his son, drew electricity from the clouds with his kite on the commons of Philadelphia, he went quietly, for fear of ridicule should his theory result in failure, because then, as at present, there were people who were superstitious about things which they did not understand. It is only a hundred years since Philip Ginther, while hunting on the mountains near Summit Hill, found a black stone which theory led him to believe it might be stone coal, which it proved to be and was first quarried in 1792, but its use was not known, and would not burn readily, it was used on garden walks in Philadelphia until after repeated efforts and failures, the closing of furnace doors to avoid danger while away to dinner, its value as fuel was accidentally discovered.

There are accidental discoveries of useful things, as for instance Bordeaux mixture; nitro-glycerine; the virtue of Peruvian bark and other things; but in a general way theory, always has a share in the practical application of discoveries. The theory of bacteria in soil, that of obtaining nitrogen from the air by chemistry, to that of navigating ships in the air are being practically worked out, while that of making rain and disseminating hail storms by explosives are held in obeyance. Like trusts, there are good theories and bad theories, among the latter, that by having had good roads, we might have hauled ourselves rich, according to logic of wheelmen, owners of fast horses and automobiles. That the losses sustained through insect injury, and other causes fabulous fortunes are missed, yet frequently the things produced do not pay cost of production.

Forestry is to abate all future taxation for coming generations. The theory entertained in some quarters that the farmers have been educated to such a high degree that none but college graduates and professors, with suffixes, Sc. D., Ph. D., Ph. C., A. B., B. S., M. A., M. S., and possibly L. L. D. These are theories that it is hoped may be realized, but it's not likely to happen before the millenium. In theory we can fertilize, trim and spray our fruit trees and make them resistent to any contingency of weather conditions but in practice the thermometer, indicates a low temperature after some warm days swelling the buds, or a May or even June frost may find the blossoms open and destroy our prospects and all our pet theories in a night.

Theory and practice go together while theory is before practice it may be designated the advance agent to progress. It is necessary in practice to give new theories careful consideration to decide whether they can be adapted to our conditions. The advocates of constant cultivation, mulching, planting stub trees, repeated spraying, might find their theories useless and impracticable under different conditions and other locations. We have some excellent teachers in the different branches of agriculture and some who know very little about any. It is related that an agricultural and city editor

of a town paper, visited a friend in the country, arriving with a conveyance with the proprietor was away. They undertook to unhitch the horses, and after unbuckeling permanent fastenings and unneccessary parts, put the horses in the stable. They tried to remove the collars, and after pulling and tugging in vain, concluded that the collars were put on when the hores were young, after which they grew so large that they must remain on permanently. Fortunately a little girl who had directed them where to place the team, observed them working on a wrong theory, came to their relief and by simply reversing the collar removed it with ease. Theoretically dairying is a highly remunerative business and if all milch cows were ideal milk producers giving upwards of a barrel of milk daily the problem of the price would be an important consideration when the price is 80 cents to a dollar for forty quarts. One of the practical problems is to get up early mornings, do the necessary chores, get a team ready to start breaking new ground during hot days when the thermometer registers 90 degrees and above, striking stones, here, and stumps and roots, turning over a bumble-bees' or yellow-jackets' nest, unable to go either ahead or backward is intensely practical.

The theory of spraying trees with Bordeaux mixture, or lime sulphur and salt which must be boiled and put on hot is a dreaded task, and practically about as disagreeable as weeding an onion patch, or hauling and spreading manure in August.

Theoretically there is both pleasure and profit in bee keeping, but when queens are to be introduced, colonies divided, swarms hived, or honey removed, working in the heat of summer, wearing a veil while working among a lot of enraged bees, bent on business, trying to find places to insert their poisonous darts, it is neither as pleasant nor as profitable as writers would have us believe. We profit, however, and enjoy privileges and blessings that are due to theory and carried to practical success. A few of men noted the names of Columbus, Newton, Harvey, Watt, Howe, Harse, Pasteur, Westinghouse, are familiar to everyone, each one of those named worked out a theory that are of vast practical utility. In horticultural lines Luther Burbank, working out theories that prove practically of much value, and among the latest that of having produced a spineless cactus plant, which will thrive in rainless districts and afford food for animals where none can live now.

Paper by Thomas Rakestraw, Kennett Square, Pa.

MUSHROOM CULTURE.

The word mushroom is used by some as a general term for a large number of the higher fungi, which would include what is generally known as mushrooms, toadstools and puff-balls. The lower fungi would include rusts, smut, molds and mildews. Others use the word in reference to the common edible kinds in cultivation, and those that grow in the fields. Still others apply it to all the

edible species, and use toadstool in reference to the poisonous kinds. Webster says a toadstool is a mushroom. It will be seen that it is difficult to give a satisfactory definition, or to tell just where mushrooms commence or where they end. There are hundreds of varieties, many of them are edible and some are poisonous. In a horticultural sense, when we speak of mushrooms, we mean those in cultivation in this country and Europe, and those that grow naturally in the fields. This variety botanists have named Agaracus Campestris. The best known of the other genera are the Coprinus, Lepiota, and the Aminita, all of which have several edible species. Among the Aminitas are a number of poisonous kinds, of which the principal one is the Aminita Phalloides which is responsible for most of the deaths caused from eating mushrooms. It is generally found in the woods or near them.

The common mushroom is umbrella shaped, and the principal parts are the stem and the cap, which has gills underneath. At first these gills are white in color, a little later they are pink, and when the mushroom becomes still older and is ripe, they are of a blackish color. This is due to the ripening of an immense number of seeds or spores on the surface of the gills. It is supposed that these seeds or spores of the mushroom, when growing in the fields, are scattered by the wind or are distributed in other ways, and when they fall in congenial places, they germinate and produce the spawn which botanists have named mycelium. A person would naturally suppose that we would be able to take the mushroom spores and raise other mushrooms from it, but so far, no one has been able to do this, though there has been a great deal of experimenting along this line. But that the spawn is produced from the spores in Nature's way, however, is almost certain.

In the growing of mushrooms, the spawn itself is cultured and divided, and the new spawn is grown from the parent stock. The spawn is the true mushroom plant, and what we call mushrooms is the fruit. The spawn or mycelium has the appearance of a network of delicate white threads which grow through the soil or manure or the beds that have been prepared for it. Under favorable circumstances, and having the right temperature, moisture, and proper nourishment, the plant developes and in due course of time produces fruit.

Cultured or made spawn is an article of commerce and is manufactured in large quantities. That used in this country is made mostly in England and comes in what are called bricks. These bricks are about 9 inches long, 5 inches wide, 1 and ½ inches thick, and weight about one pound. They are made of horse manure, cow manure and soil mixed together. After the bricks are made into shape, and are dried sufficiently, a small piece of spawn is placed in the center of each and the hole is closed up with a piece of the same material of which the brick is made. A bed of horse manure is prepared as for a hot bed. The bricks are piled upon it, but not too closely, and are then covered up. The moisture and heat from the manure will start the spawn to grow or run through the bricks. When this process has gone far enough, the bricks are allowed to cool off and dry, and further growth is stopped until they are to be used for producing a crop.

The manufacture of spawn is regraded as a very particular business requiring great skill and care. The French make and sell what is called flake spawn but it is not much used in this country. It is light, and comes in large strawy flakes. There is an American spawn of very recent introduction which is now used to some extent. It seems likely that it may come into general use as excellent results were obtained from it during the past season. This American spawn is made by taking pieces of the mushroom itself for propagating purposes, and it is claimed that the manufacturers can by this method produce and propagate any particular strain and that by selecting fine specimens for the purpose, they can make a spawn that will produce mushrooms like the parent stock.

Virgin spawn is that which is obtained from the fields or manure heaps, and is supposed to come from the spores. It is more vigorous than made spawn, and manufacturers endeavor to get it to use in making the spawn which they sell.

Mushrooms grow in all temperate climates in the world but they will not grow where it is either too cold or too hot. They may be grown in houses built for their cultivation, in house cellars, barn cellars, under the carnation benches in greenhouses, in caves or in any other place where the temperature and moisture can be controlled and kept about uniform and at the proper degree.

A common plan for houses is about as follows: 100 feet long, 18 feet wide and 6 feet to the eaves and with an even span roof. This will allow three beds, 3 and ½ feet wide on each side, and four beds 7 feet wide in the center, and two alleys, 2 feet wide, to give room for picking the crop, putting in the manure and taking it out, after the cropping season is over. The entire bed surface of such a house would be 4,900 square feet, and would require about 100 tons of manure costing $1.25 per ton exclusive of freight and 1,200 pounds of spawn costing 6 cents a pound. Mushroom houses generally have a cellar of 2 or 3 feet dug out, and the dirt is also banked up around the house on the outside. This tends to make it easier to keep as even temperature which is a very important consideration.

Horse manure from the cities is the kind generally used. It should be free from any other matter and not too strawy. It is put in ricks as hauled from the car and earth is mixed with it as it is piled—usually in the proportion of about 5 cart-loads of earth to 20 tons of manure. While the manure is in preparation, the rick is turned at three or four different times until it is considered in the proper condition. It is then put in the beds in the mushroom house to the depth of about 8 inches and packed quite firm. The temperature of the manure will rise to 100 degrees or more, but will soon fall. Growers usually spawn the beds when it has dropped to about 90 degrees. The spawning process consists in cutting up the bricks in about 8 pieces and putting them 2 inches deep in the manure and 10 inches apart. In a week or 10 days the beds are covered with about 1 and ½ inches of earth—rich sod—with the heavier grassy parts of the sod thrown out is considered the best. It should be moderately moist, but not wet, and it should be made firm. After this is done, a temperature of about 60 degrees is desirable.

The length of time until signs of mushrooms appear on the surface varies, as they are sometimes much slower than others, but

usually, in about 5 or 6 weeks there will be an appearance like white mold on the surface, and in a short time after this, the mushrooms will appear. During the interval of time from spawning until the crop comes, the anxious grower will be examining the beds to see if the spawn is running freely and filling the entire mass of manure with a complete network of small white veins. If it is doing this, he is pleased with the prospect. At the joints in this network of spawn or mycelium little rounded enlargements are formed. These are called buttons, and as they grow and come up to the surface they are supported by a stem. They very soon push up through the manure and dirt and we have the mushroom. It seems quite a while after the house is spawned until there is any crop, but when they once get to coming through the soil, they develop very rapidly. After the mushroom house is producing, the temperature should be kept as near 55 degrees as possible. A high temperature brings the crop on too rapidly and exhausts the beds. The mushrooms will be weak, of poor quality and will have objectionably long stems.

Much care must be observed in the watering. It is the custom to moisten the beds when the first signs of mushrooms appear and afterwards whenever the soil shows signs of dryness. They should never be flooded, simply enough water being applied to keep the earth moist but not enough to get very dry before watering. Heavy drenching is considered injurious to young mushrooms. Hence the necessity of watering sparingly and often, but not more often than necessary to maintain a moderate moistness in the soil.

After the cropping season begins the mushrooms develop very rapidly and it is only a few days after they begin to come through the ground until they are ready to pick. They must be gathered every day. They must not be cut off, but pulled. In preparing them for market, the roots are cut off, and then they are firmly packed, with the caps up, in four pound baskets made especially for the purpose. Those grown in this section are sold mostly in New York and Philadelphia markets. Prices vary in different years and at different times in the year. Early in the fall they often bring as much at 75 cents to $1.00 a pound, and late in the spring, before the weather gets hot, they will often bring the same price. But the bulk of the crop, however, is gathered between these extreme seasons, and brings to the grower prices varying from 25 to 60 cents a pound:

After the crop is over the houses are cleaned out. The refuse makes a good top dressing for any soil. The houses should be thoroughly purified and everything about the house should be whitewashed in order to destroy any objectionable fungi that may be about the place, and which might make trouble in the next crop.

The growing of mushrooms has increased very much during the last few years. Ten years ago there were perhaps not one-fourth as many grown in this section as there are now, and then the price was sometimes as low as 17 and 18 cents a pound. This shows there is an increasing demand and that people are finding out that mushrooms are good to eat. Chester and Delaware counties are important factors in the supply of mushrooms to the eastern cities and are no doubt the greatest mushroom producing sections in this country. There are several growers who use as much as 500 tons of

manure annually and others who use more than this. It is estimated that there is used in the aggregate as much as 10,000 tons annually in these two counties.

There are a great many mushrooms grown in England, many more there than here. The French have made a specialty of growing them in what are called "The Caves" at Paris. These underground caves or tunnels are abandoned quarries from which building stones have been taken. They are from 40 to 125 feet under ground and vary in height and width according to the size of the vein of stone quarried. A few of them are entered horizontally, but most of them are entered from a perpendicular shaft at the top. Workmen ascend and descend by means of a ladder. The manure is prepared above ground and when ready to be used, it is thrown down the hole. The refuse is taken up by means of a windlass.

Their methods are quite different from the English or American. They make no beds like ours. The manure is made up in ridges. There ridges are 18 inches wide at the bottom, 6 inches wide at the top and about 18 inches high. Alleys a foot wide are left between the ridges. They are spawned and earthened much the same as the Americans do, only they use the flake spawn. They are considered expert growers and many of them are engaged extensively in the business—some using as much as 3,000 tons of manure annually. The mushrooms are sold at auction in Paris, but at a lower price than in this country. For a few years there seemed to be a desire here to imitate the French in their methods, but about all have abandoned them.

Thus far it would seem as if it was all smooth sailing for the mushroom grower but such is not the case. In the early spring maggots are likely to attack them, and they are liable to a disease called black spot. They are also subject to slugs which eat holes in them. Fogging off is a common trouble. It consists in the softening, shriveling and perishing of the young mushrooms, which assume a brownish color. It is considered a root trouble and may be produced by too much watering, a drip in the bed, disturbing the mycelium when picking the mushrooms or any other cause that disturbs the mycelium will cause the young mushrooms to fog off.

There is a great deal of uncertainty connected with their production. In fact, there seems to be no certainty. Beds spawned the same day with the same kind of spawn may give very different results. The beds may be alike in every particular and the grower will not be able to tell why the one failed and the other was a success. The learner is just about as likely to have a heavy crop as the veteran of 20 years experience. An old barn cellar or house cellar, an abandoned silo or ice-house may produce an exceptionally heavy crop, while the mushroom house, built after the most approved pattern, may prove a complete failure. Indeed, there is so much uncertainty, that old growers are cautious about giving advice, and will say they know nothing about the growing of mushrooms. If any one is fond of uncertainty, and wishes to engage in a first class lottery, let him go into mushroom growing.

It is a general opinion that the cause of many failures is in the spawn. It may be, that in its manufacture, it has been overheated, or, on ship board it has possibly been too close to the boiler, and the moisture and heat have started it to grow, either of which would

damage it seriously. Perhaps we sometimes get old spawn, which is considered very objectionable. It is very difficult to tell good spawn—spawn that will produce desirable results with any degree of certainty, and but few of the men who grow mushrooms are able to separate the good from the bad. It seems that this should centainly be a part of the business that every grower might understand. The manure, spawn and labor are all expensive, and there should be some security that the spawn is fresh and strong, and that it only needs the warmth, moisture and plant food properly applied, to reward the grower for his vigilance and labor.

ARGUMENTS FOR AND AGAINST THE FUMIGATION OF ALL KINDS OF NURSERY STOCK LIABLE TO INFESTATION BY SAN JOSE SCALE.

Address by Prof. H. A. Surface, Economic Zoologist of Pennsylvania.

By fumigation we mean subjecting an object to exposure to deadly fumes when confined within a closed space. The vital range between a tree and an insect attacking the same is so wide that the fumes may be made strong enough to kill the pest without injuring the tree or plant. It is found by many experiments that fumigation is the only effective means of killing the San José Scale and certain other destructive pests when found upon nursery stock, and thus preventing their spread to orchards in which this stock is to be planted.

One may fumigate with carbon bisulphide or any other material that will produce deadly fumes, but the best material that is now known is hydrocyanic acid gas, generated by dropping cyanide of potassium into sulphuric acid dilute with water. The requirements in the State of Pennsylvania, and in fact in most States of the Union, are that the cyanide must be 98 per cent. pure, the sulphuric acid must be 1.83 per cent. specific gravity, and the following amount must be used for each one hundred cubic feet of enclosed space:

One oz. (by weight) of cyanide of potassium.

Two oz. (by measure) of sulphuric acid.

Four oz. of water.

The sulphuric acid is to be poured into the water in an earthen or wooden vessel, and the cyanide is to be dropped in suddenly. Then the operator must escape from the room just as quickly as possible. It is best to have the proper amounts computed according to the size of the room, using the above formula for each one hundred cubic feet, and have them weighed and measured, and the cyanide placed in a small paper bag ready to drop in at once and permit the immediate escape of the operator from the fumes, which are most deadly.

It has been found by actual experimentation that prolonged exposure of a low grade of material, or to fumes from a less quantity of material, is more likely to injure the plants, without being so

sure of killing the scale, as is exposure to the fumes of a sufficient amount for a shorter time. That is to say, short exposure (about forty minutes) with the above formula is proven to be more injurious to the insects and less injurious to the plants, than longer exposure with less material, or with weaker material.

It is necessary (1) that the cubic contents of the room be accurately determined; (2) that the room be air-tight or gas-tight; (3) that the cyanide of potassium be 98 per cent. pure; (4) that the sulphuric acid be as strong as 1.83 per cent.; (5) that a sufficient amount be used to preserve this formula according to each one hundred cubic feet of space (6) that the fumigating house be not over packed with tightly crowded plants; (7) that the plants be not wet during the time of fumigation; (8) that the fumigation continue for at least forty minutes; (9) that the gas be administered from below rather than from above; (10) that the fumigating house be air-tight and kept tightly closed during the entire period of fumigation, and (11) that the plants be practically dormant. It also is important that the room be so constructed that it can be quickly ventilated after fumigation is finished, and that this ventilation be done rapidly, according to directions. If the trees be covered with mud or be encased in any covering that the gas does not readily penetrate, those scales that are covered will not be killed. If the roots of the trees be packed in damp moss or other material at the time of fumigation, there is especial danger of injury to them.

With these facts in mind, let us first say why all nursery stock in this State of kinds not liable to attack by the San José Scale should be fumigated before being sold, shipped or transplanted. It should be said that by the expression of "kinds not liable to infestation by the San José Scale" we mean conifers, strawberry plants, bulbs and tubers, herbaceous perennials and bedding plants.

1. It is acknowledged by all practical entomologists who have made a careful study and proper tests in this subject that fumigation is effective in killing the scale when properly done. Much of importance depends upon the expression "when properly done."

2. Fumigation does not injure any kind of nursery stock that is attacked by the San José Scale, when properly fumigated. In the early fall and late spring while the trees are not dormant there may be slight injury, but this proven to be insignificant. A fruit grower and nurserymen in this State recently told the writer that he had fumigated apple trees in the spring after they had started to grow and when the new shoots were from three to six inches long. He used the above formula and transplanted the trees in his own orchard. The growth was not checked, the trees were not injured, and the scales were killed.

3. Another argument for fumigation is that it prevents the dissemination of scale insects and many other pests from any and all nurseries, whether the inspector has found it in them or not. No inspector can possibly find all the scale insects in any nursery or all of the trees that have only a few of these pests upon them, but the gas when properly applied can find nearly if not quite all.

4. Many States are requiring fumigation of all nursery stock. No less than eight states have this requirement. We should not require it for our State merely because others do the same, but the

best fruit-growing states of America and also Canada would not require universal fumigation if the experts and scientific persons in those States did not find it best.

5. No other treatment of any nursery stock which is suspected of being infested is known to be as effective in killing the scale or as safe to the trees. Since this is true, fumigation—the best method—should be ours.

6. A further and very strong argument for fumigation of all nursery stock, especially of all fruit trees, is that the fruit growers want it. They find that the pest is carried into their regions upon nursery stock that has not been properly treated, and generally not treated at all. It is very important that its dissemination by this means be entirely checked. The best authorities in our country have nothing better to offer than universal fumigation.

Arguments Against Fumigation.

With this, as with every question, that are two sides. Let us try to take as honest a view of the opposing side as we have taken of that just discussed. For certain reasons the nurserymen are justified in opposing fumigation as performed by many persons.

1. Fumigation may not be effective. If it be not effective, why should we require it? It will be ineffective when any one or more of the conditions named in the early part of this article are missing or improper. By "ineffective" we mean that the scale will not be killed. When fumigated for too short time, or by poor material, or when the trees are so wet that they are covered by a film of water, when the house is poorly constructed and leaks gas, when overpacked, when insufficient material is used, etc., the scale will not be killed and the expense and time and trouble of fumigation will be for nothing.

2. Fumigation may be made to injure plants, and it does injure them when improperly done. This may come from too long exposure, using too much material, fumigating plants when not in dormant condition, fumigating them when the roots are packed in damp packing material, fumigating them in a room that is not adapted to ventiation, for example, a box car, fumigating at a very high temperature or while the room is very warm, and also fumigating varieties such as conifers and greenhouse plants that are too delicate to stand full strength. It should be said that the latter may be fumigated when necessary by reducing the strength, as should be done for peach when quite dormant or the wood is not hardened. All fruit trees when dormant will stand much more than the formula above indicated.

3. Fumigation is troublesome and expensive to nurserymen. When a large firm is rushing its orders in the spring, it is as busy as any extensive farmer at haymaking time, especially if there should be prolonged rains at this time, it would be quite a hindrance to their work to impose the necessity of fumigation. The only thing for them to do would be to permit each load of trees to stand under shelter until the bark is dry. Standing over night should be sufficient for them to dry enough to fumigate in the morning.

4. Fumigation demands the attention of a very careful and reliable man during the "harvest" season when the nurserymen are busiest, and to make such demand upon nurserymen must have most serious justification.

5. Some nurseries are not in the infested regions and do not have San José Scale. It is a question if nurseries that are known to be clean should be compelled to fumigate. On the other hand scale has been spread on stock that was thought to be clean. This is a common case of putting similar requirements on all persons in order to permit no guilty one to escape.

6. Some nurserymen do not want fumigation. They have as much liberty to say that they do not want fumigation as the fruit growers have to say they want it done. Whether they have as much justice in this statement depends upon conditions. If a man thinks he has no San José Scale and should not fumigate he may disseminate it, but if he knows he has none, no good will be done by the fumigation, and yet when properly done no harm will come from it.

On the whole, our observations, studies and experience lead us to say that universal fumigation is the only safeguard for fruit growers.

Adjourned.

Afternoon Session.

Before taking up the regular programme the following was offered by Prof. Watts.

Resolved, That the Pennsylvania State Horticultural Association hereby records its appreciation of the recognition accorded to the agricultural and horticultural interests of the State by the last Legislature in the appropriation of $100,000 to begin the erection at the Pennsylvania State College of an agricultural building, with the proviso that the total cost shall not exceed $250,000.

Resolved, That we request and urge the coming Legislature to provide for the immediate completion of the building by the appropriation of the remaining $150,000, in order that all branches of agricultural education at the State College may be as well housed as is the dairy work in the portion of the building now completed.

Resolved, That this organization appreciates the work done for agricultural education in the past under very unfavorable conditions by the Pennsylvania State College and that it requests from the next Legislature a liberal appropriation for the maintenance of the various agricultural courses, in order that the equipment already provided may be utilized to the fullest possible extent.

Resolved, That in view of the importance of scientific investigation to the development of the horticultural interests of the State, and of the fact that in the past scarcely any State aid has been given to the Agricultural Experiment Station, the Horticultural Association is heartily in favor of a liberal appropriation by the State for the maintenance and enlargement of the current work of the Station, particularly along the line of a study of the insect and fungous enemies of the horticulturist.

Resolved, That the secretary be instructed to send a copy of these resolutions to the secretary of the Allied Agricultural Organizations, and that the Legislative Committee be instructed to co-operate with that organization in securing the desired legislation.

MR. HIESTER.—As a trustee of the College and Station, I would like to make a brief explanation. The last Legislature made an appropriation of $100,000 for an agricultural building, but has made no provision for maintenance. Money must also be provided for Dean's salary and a residence for him, and nothing has been provided for horticulture. I hope every member of this association will use his influence to obtain some recognition for horticulture in addition to agriculture.

On motion resolutions were unanimously adopted.

Report of Committee on Legislation.

The following was submitted by Mr. Hiester.

Section 1. We would recommend a modification of the nursery inspection act to make it include private premises, and inspection for San José Scale and other pests and diseases in orchards and on public and private grounds. This would be done by the Secretary of Agriculture through the Economic Zoologist by such means as shall be considered most effective in bringing about the desired results, and would recommend an appropriation of $30,000 annually for carrying out this work.

MR. STOUT.—This is an important section and should be considered very carefully. Whether this work should be undertaken by the State is a problem. The San José Scale is a very difficult insect to control.

MR. HIESTER.—The Nurserymen's Association which has recently held a meeting in this city, has considered this question very carefully. They are required to keep their nurseries free from San José Scale, and think that fruit grower's should do the same, so long as premises in proximity to the nurseries are infested their efforts to keep nursery stock clean, are in a measure futile. We believe it is to the interest of all to try to suppress the scale for the public good.

MR. CHASE.—As I understand it, it makes it the duty of the State to protect the citizen against his careless neighbor.

The section was adopted as read.

Section 2. "We also recommend the establishment of a Division of Horticulture in the Department of Agriculture, to be administered by a Commissioner, who shall be a practical horticulturist of experience, and who shall be assisted by a clerk and stenographer, and would recommend an appropriation by the Legislature of $10,000 annually, or so much as may be necessary for payment of salaries and other expenses of this Department.

PROF. BUTZ—A bill of this tenor was passed by the last Legislature and vetoed by the Governor on account of some defect or technicality.

On motion the section was approved.

The following paper was read by John G. Rush, West Willow, Pa.:

THE PERSIAN WALNUT.

It is not my purpose at this time to give you a lengthy and descriptive history of the Persian Walnut from its early introduction

into this country, but to be as brief and practical as possible. It is a well-known fact that it is grown in almost every State in the Union. It is also well for us to know in which of the States it finds a natural adaption to its best development.

The Black Walnut is a good leader where it succeeds and the Persian Walnut is a close follower, as it belongs to the same genus. I do not know anywhere on the Atlantic coast, or in the interior, that the Persian Walnut is grown for commercial purposes, but on the Pacific coast they are grown very extensively and find a ready market in the Atlantic coast cities.

It is not altogether just that California and some foreign countries should have the exclusive privilege to this market, when it is possible that the Persian Walnut can be as successfully grown here as elsewhere. Now right hear who is to blame? Adam, speak out, as you did once before, well, the blame is right here, and let him whom it hits take it.

Up to this time all Persian Walnut trees have been sold by nurserymen as seedlings, and as a result we have a conglomeration of all types and shades of Persians. The Persian Walnut may be successfully grown in sections where no other trees grow of the same genus, otherwise you are bound to have a mixture which is very annoying to the nut grower.

I do not wish to be understood that grafting alone will remedy the trouble that I see at home, in my own village, where the Persian has been very successfully grafted on the Black Walnut. If proper selection of the variety or kinds had been made, one might be proud of the result, but the grafted tree is no better than the seedling.

There are some very good seedling Persians, but they are few and far between. I have in my yard on the farm a Persian than which I saw nothing more productive last summer when on a visit to Santa Barbara, Cal. At ten years of age I had two bushels and increased to three bushels last fall. I have another tree the same age only 40 feet away, that had about three quarts. Such examples as this makes one think of the subject of Nature Study.

As I had access to these trees I watched closely to see why the difference in productiveness. The three quart tree had a profusion of staminate bloom, but dropped too soon to fertilize the pistilates, hence the failure. The three bushel tree is a little later in bloom, but both staminate and pistalate developed together until well fertilized, showing there is a mechanical difference in trees and plants as well as in the animal kingdom.

Now the question arose in my mind, have I the only "pebble on the beach?" So I made it my special object to go in search of prolific Persians. I drove eastward about twenty miles in a very populous section of Lancaster county, and found nothing worthy of mention, but a few mongrels. A few days afterwards I took a western drive in the neighborhood of the former Conestoga nurseries, feeling sure, that our departed friend, Caspar Hiller might have a Persian to his memory. I found two large trees here, but not prolific enough to be any value. I stated at this place the object of my pursuit. I was directed about one-fourth mile farther westward to a somewhat secluded place, where I found two large trees that were as prolific as my own. I still continued my search for more

Persians and at last I came upon another tree that was a perfect beauty for productiveness. Having a long and intimate acquaintance with the owner I asked the question, why this tree so prolific and the other three trees so shy? As no reason could be given, the verdict was "only by chance." With this investigation I found that only about four per cent. of all the Persian Walnut trees I saw are worthy of propagation.

Several years ago I tried to raise seedlings from my trees, but discovered very soon in the early life of these young trees that they were tainted with foreign blood. The leaves of these little Persians were serrated or tooth edged, and were nine and eleven in number, and on rubbing the leaves in my hand they would throw off a Black Walnut odor, whereas the parent shows five and seven leaflets with a smooth edge and on rubbing through the hand would transmit a very sweet oder, so by propagating with seed we only perpetuate the specie and not the variety. The only remedy then, is to resort to grafting or breeding of prolific trees to insure success.

The art of grafting and budding the Persian Walnut in this locality is somewhat unknown to our enterprising propagaters. It is, however, very successfully performed in other localities where special efforts are made in that direction.

In 1895 I bought a small order of trees from New Jersey, among them were three Japan Walnut and one Persian, the variety catalogued as the Kahasi, noted for its early and prolific bearing. Last summer I found to my surprise this Kahasi well loaded with pistellate bloom sparkling in the sunlight like diamonds, and no staminate in sight, so of course something had to be done to assist the tree to develop its fruit. I went on my farm not far away and got about a dozen and a half of good staminate twigs, and put them in a dozen bottles with water in order to keep fresh. These bottles were then hung promiscously over the tree in order that the pollen might have free access to the proper fertilization of the pistilates. Now the result; last fall I managed to harvest 200 well developed meaty nuts for the little assistance rendered in Nature Study.

When the United States Department of Agriculture introduced nut culture in the United States no mention was made of the Persian Walnut on the Atlantic coast, all information on the subject having came from the Pacific coast. If we exert ourselves as they do, I am sure we can attain the same results, and have the benefits of the Atlantic coast market with very little expense. I look upon the introduction of the Japan Walnut the next thing to insult. As soon as I had the first fruit, I introduced the American axe (not the missionary) to its roots and converted them to fire wood. Even our American Butternut is far superior and the Black Walnut still more so. The Persian Walnut tree is very beautiful with its clean white bark, shaded with green, glassy leaves during summer time, and when autumn approaches it is a pleasure to see the hull cracking open showing what is inside, smiling all the while until gathering time. Believe me, there is nothing that I delight more than to shake a well filled Persian of its nuts, and how they rattle through the limbs and leaves, roll and tumble over the green sod in merry laughter, waiting to be gathered by the husbandman for future use.

The tree is proof against many ailments, such as borers, yellows,

blight, caterpillars and San José Scale. The nut is also proof against the pernicious Chestnut Weevil, and can be used in various ways in the household for daily food or luxury.

It can be kept for two years without any injury to its good qualities with proper care and attention in storage.

The pleasure I have derived from this experimental work I feel myself compensated with the close communion I had with natures handiwork, and feel to continue in its further researches to greater developments. I also keep in connection an exhibition on back porch, a table well filled with all kinds of native nuts and how they grow, for the benefit of school children, friends and neighbors, and above all myself.

In the last fiscal year Grenoble shipped to this country $450,320 worth of walnuts. This should not be the case. We should raise our own walnuts, both for the goodness of the fruit and the value of the wood. Practically, the land over, the wild walnut tree has disappeared, and yet, with the demonstrated profit there is in the tree, people connot be induced to plant it. It may be it is a slow grower, but every generation should think of its successors and plant for them.

MR. STOUT.—Some twenty years ago I planted some English Walnuts, and they have frozen back every winter. They are only 8 or 10 feet high at this time and have never borne any nuts.

MR. CHASE.—In Burlington County, N. J., they are able to grow them. Some varieties are more hardy and prolific than others.

MR. RAKESTRAW.—I think the hardiness of the English Walnut depends largely upon elevation. On low lands they are liable to injury, and on elevated lands they are seldom injured at all.

MR. RUSH.—This may be owing more to variety than locality.

The following paper was read by Mr. Wm. F. McSparran, Furniss, Pa.

THE CONSERVATION OF MOISTURE IN THE ORCHARD.

The best method of conserving soil moisture must remain largely theoretical for there are so many circumstances of soil and other conditions that no rule may be laid down as the best for all to follow.

The orchardist as well as the general farmer, if he stops to think about the matter, must realize the prime importance of soil moisture in the growth of any of our farm crops. But it is no uncommon observation of the student of agricultural economy that in a great many very important things the common run of farmers do not stop to think at all. This remark of course does not apply with any particular force to such past-masters of soil tillage as I have the pleasure of here addressing, and I trust I may be pardoned for here turning aside to say that it is very common in agricultural teaching that it is the fellow who does not need it instead of the multitude that does need it, who gets it.

We, therefore, all know of the importance of soil-moisture to the horticulturist, but I am not so sure that we are all so fully cognizant of the great necessity of our using every reasonable means for holding in the soil, conserving the earth supply of moisture, so it may to the utmost be used by our growing crops in garden, field and orchard. I will doubtless be held as radical in making the statement that our crops, and those of the orchard especially, are almost entirely dependent upon the supply of stored soil-moisture, and not upon that gathered from the rain fall during the season of the crop's growing.

If I am correct in this claim the importance of the most careful conservation of the moisture supply is paramount. If I am only half right and the good crop's success depends upon the current rains partly and partly upon the earth supply, the importance of the latter is not lessened in its relation to this crop. It is obvious the orchard must have the earth moisture to draw upon. It is as plain that without the intervening care of the orchardist the atmosphere draws upon this moisture to the loss of the crop and its owner; hence we come to say how shall we best conserve the soil supply so it be not wasted into the thirsty atmosphere?

The first theory was that we shall arrest the loss by creating a non-conducting object between the moisture and the air. We should mulch. We should break the connection between the two and allow the moisture to only reach the atmosphere through the organisms of our growing crops or trees. We find this can be very effectually done by frequent cultivation of the soil and men have come to talk wisely and some of them incessantly of the "dust mulch."

But the time has come when other men are to be found who question the wisdom or at least the economy of the "dust mulch," for the young growing, unshading orchard. We have discovered the soil bacterium and the more we study and learn about him the more we are inclined to modify many old ideas that were one time good enough. It appears now to be well established that our soil fertility largely depends upon the bacterial occupancy of it. The wise soil worker, therefore, if that be true, will use every economical means to maintain in his land conditions favorable to the existence and multiplication of these now-found friendly organisms; and it has become a matter of considerable doubt whether we are encouraging them when we are subjecting our unoccupied, unshaded soil to the frequent stirrings necessary to keep an effective dust mulch through the long season of the summer heat.

This is not intended as an argument that we shall stop the cultivated and allow the crust to form on the surface of the bare ground, for fear we unsettled the operations of the bacteria. By no means. The dust mulch saves more in its moisture conservation than is lost from its bacterial disturbance; but the better plan seems to be to have the ground occupied by some crop that shall at once serve almost all the good offices of a mulch, create favorable conditions for soil bacteria, and as an incident and consequence of its growth really add to the sum of the land's fertility. It is true that these crops use moisture in proportion to the success of their growth, but no maker of figures has yet come forward to tell us how much

more moisture they use than is wasted from bare land even when covered by the most orthodox dust mulch. The latter cannot possibly add anything to the fertility store of the land, it can only arrest the action of capillarity; the former can do as much while further enriching the soil actively and potentially and contributing that quality of humus to the land, so more moisture will be absorbed and held for plant use.

It is true that in the discussion of such a topic as this we cannot get beyond the realm of theory and speculation, for climatic and soil conditions are as changeable and variable as orchards and fields are numerous; but it is my deliberate opinion that the most logical methods of conserving moisture for the orchad, is by the agency of a growing crop, to be finally worked into the soil.

MR. HIESTER.—What shall I sow in stony mountain land in order to get more humus into the soil?

MR. McSPARRAN.—I would first try to ascertain whether the soil needs phosphoric acid and potash. If deficient in these mineral elements I would supply them and sow about a bushel of cow peas per acre. If the ground were not reasonably fertile I would experiment at least with artificial bacterial inoculation.

The peas should not be sown until the ground is warm—say the latter part of May or early June. In the fall this crop should be plowed under or disked into the soil and the land sown to sand vetch and rye to, in turn, be plowed under the following spring.

Collecting a large amount of humus on stony, hilly or mountainous land is a difficult matter and I think on such land devoted to fruit culture, my prescription might profitably be continued in use indefinitely.

DR. MAYER.—What variety of peas would you plant?

MR. McSPARRAN.—Any of the ordinary vining kinds. There are endless names for them. The whip-poor-will is usually an erect grower, but makes a heavy growth. New Era and Red Ripper are good trailing kinds. I have had good crops from sowing mixed varieties the seed of which can usually be bought somewhat cheaper than pure seed. Unless bacteria are present in the soil artificial inoculation is desirable, as only by these agents it is supposed legumes can get, use, and store atmospheric nitrogen.

Mr. Peters of special committee on new fruits on exhibition submitted the following:

Mr. President: The Committee on New Fruits reports as follows:

There were 21 plates of new fruits, consisting of apples in the main; of these 21 plates, we found 11 plates to be varieties of known names, which probably were not known in the community in which they were raised, and we have placed the names on the card on each plate.

We found no new fruits that were of special merit, or worthy of mention, when compared with the vast number of excellent varieties we have at this time. One jar of plums, however, exceeded anything else we have seen in canned plums; it is a native gage of medium size, and of most delicious flavor; having retained almost all its sweetness, although canned with the pits in the fruit.

If in order, we would recommend that in future exhibits of new fruits, 5 specimens of the same kind be placed on every plate, and that these specimens be nearly perfect.

Respectfully submitted by your committee.

EARL PETERS,
JOHN F. BOYER,
R. L. MARLATT,
Committee.

The chair announced that owing to business engagement at the Executive Chamber, Governor Pennypacker would be unable to be present at our meeting.

Mr. Black (New Jersey), expressed his pleasure and gratification in being able to attend our meeting, and extended a cordial invitation to the Society to send delegates to their next annual meeting. Every courtesy would be extended by their Society. He expressed the hope also that a fraternal spirit be perpetuated between our or ganizations.

Mr. Reid (New Jersey), cordially endorsed the remarks of his fellow delegate, and hoped to have the pleasure of meeting with us again.

MR. CHASE.—I will be glad to refer this matter to the new President, Mr. Hiester, and hope that in the future this association will not only have closer and more cordial fraternial relations with the New Jersey Society, but will send delegates as requested.

QUESTION BOX.

(1) Is refuse chloride of lime from dyeing establishments of value as plant food?

DR. MAYER.—I would consider it injurious to the soil owing to the amount of chlorine present.

(2) Should the robin be protected?

MR. SNAVELY.—I do not believe in eradicating the robin, though I am satisfied he is doing more mischief than any other agency in disseminating San José Scale. He also destroys fruit, but I do not condemn him on that account. When too numerous he is a nuisance and should be held in check.

MR. BLACK, (N. J.)—For years I was a friend of the robin, but I am his enemy now. Much that has been said and written about him is sentiment, and not warranted by facts. In New Jersey he lives on our fruit, sometimes destroying it entirely. He may do better elsewhere, but with us he does far more harm than good.

MR. SNAVELY.—What is the legal status of the robin?

PROF. SURFACE.—According to our law any bird or animal may be killed by the owner of the farm or premises, when found destroying fruit or other property. Birds in the act of destroying fruit on trees or berry fields may be shot by the owner of the premises, just as deer may be killed when destroying field crops. If properly provided for the robin will not destroy berries or choice fruit. If they have access to mulberries they will eat them to the exclusion of other berries. I know several persons who have taken this course with satisfactory results.

DR. MAYER.—I have had considerable experience with the robin, and like my friend from New Jersey, was his friend for years. As a fruit grower, I consider him a nuisance. Have found that planting mulberries to keep him away from other fruit is a humbug.

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MR. BLACK.—I do not like to disagree with a Professor, all through life I have been a friend of birds, but my experience is not the same as Mr. Powell's, the party referred to by Prof. Surface, my experience is that the robin will not eat mulberries or small fruit when larger can be had. New Jersey robins never eat small cherries when they can get Black Tartarians.

MR. SNAVELY.—I fully agree with my friend from New Jersey. On my premises robins always prefer the best .

PROF. SURFACE.—On State College campus we have robins by the hundred, just across the way is my strawberry patch, and I have never lost any berries by robins, when able to get other fruit.

The following was offered by Mr. Peters and adopted.

Resolved, That the State Horticultural Association of Pennsylvania in annual convention assembled, recommends to the State Legislature now in session, that all lands adjacent to any nursery in the State shall be inspected for a distance of one mile surrounding such nursery, and furthermore,

Resolved, That any and all nursery stock shipped, subject to San José Scale, shall be thoroughly fumigated with hydrocyanic acid gas before it is shipped.

The following was offered by Mr. Moon, and unanimously adopted:

"This committee reports that the State Horticultural Association is again called upon to record the loss of members by death.

We have been informed of the death of two of our members, viz: Daniel Smeych, of Lancaster, Pa., which occurred April 5, 1904, at the advanced age of 76 years. He was one of Lancasters well-known citizens who for many years was an attendant at our annual meetings, especially when held in his home city. He was an occassional exhibitor of his choice fruits, and although but seldom taking part in the discussions, he was an interested listener, and a loyal member of this association.

The death of Joseph W. Thomas, of King of Prussia, Montgomery county, removes from our midst one of our oldest and most useful members. We believe he was one of the organizers of this association. He was one of our most active and practical members. Of a kind and genial temperament, he had a warm welcome for all at our annual assemblies. He was one of the leading nurserymen of the State as well as one of the best informed horticulturists, and most successful fruit growers. He was always willing to contribute his share to inform and instruct those less fortunate in knowledge and experience. Until within a few years he was a regular attendant at our meetings.

We cannot but feel that we have lost a personal friend. His death, which has removed from our midst one of our ablest and best informed members occurred September 19, 1904, in the 73d year of his age.

Signed

J. MORRIS JONES,
WM. H. MOON,
JAS. KREWSON.

Mr. Chase, the retiring President, thanked the members of the association for their uniform kindness and courtesy during his incumbency, and declared the association adjourned.

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OF THE

State Horticultural Association

OF

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STATE HORTICULTURAL ASSOCIATION OF PENNSYLVANIA.

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Chase, Charles T., Perry Building, 16th and Chestnut Sts, Philadelphia.
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Cornelius, Robert, Philadelphia (deceased).
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Engle, John G., Marietta, Lancaster Co.
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Wickersham, Dr. J. P., Lancaster, Pa. (deceased).
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REPORT

OF THE

FORTY-SEVENTH ANNUAL MEETING

OF THE

State Horticultural Association

OF

PENNSYLVANIA

Held at Gettysburg, Pa., January 16-17, 1906.

An awakening interest in fruit growing in Adams county, fostered and encouraged by an active local organization, "The Fruit Growers' Association of Adams County," together with a varied and interesting programme of practical speakers and horticulturists of acknowledged ability and reputation, combined to make this a most instructive and interesting occasion.

The display of fruit, although not so large as some exhibits at previous meetings, was unusually fine, and was an evidence of the growing interest that is being manifested in apple culture in Adams county.

As a full report of the different exhibits and exhibitors is given elsewhere in detail, no description will be attempted here.

The following life and annual members have joined the Association since our last meeting:

LIFE MEMBERS.

Gabriel Hiester, Harrisburg, Pa.
Ehrman B. Mitchell, Harrisburg, Pa.
Edward A. Woods, Pittsburg, Pa.

ANNUAL MEMBERS.

W. S. Adams, Aspers, Pa.
A. T. Baird, Island, Pa.
N. C. Beachy, Allentown, Pa.
R. G. Brooke, Schwenkville, Pa.

A. N. Brown, Wyoming, Del.
R. M. Cummings, Montandon, Pa.
Milton C. Dietz, Mechanicsburg, Pa.
Henry Eicholtz, Waynesboro, Pa.
Robt. M. Elden, Aspers, Pa.
D. M. Ellis, Bridgeport, Pa.
W. A. Freed, Homewood, Pa.
John D. Hait, Bryn Mawr, Pa.
John D. Herr, Millersville, Pa.
William Hummel, Bradford, Pa.
D. C. Kauffman, York, Pa.
T. C. Le Fevre, Harrisburg, Pa.
A. B. Lehman, Fayetteville, Pa.
R. W. McAllen, Fannettsburg, Pa.
N. G. Miller, Harrisburg, Pa.
Saml. C. Moon, Morrisville, Pa.
Mrs. Elizabeth D. Morton, Ingram, Pa.
J. E. Moudy, Littlestown, Pa.
Miss B. G. Pierce, 3300 Arch St., Philadelphia, Pa.
B. G. Pratt Co., 11 Broadway, New York, N. Y.
Dr. J. S. Rittenhouse, Lorane, Pa.
Albert Shorb, Hanover, Pa.
W. H. Swartwood, Falls, Pa.
Dr. S. Y. Thompson, Danville, Pa.
Edwin C. Tyson, Floradale, Pa.
Chester J. Tyson, Floradale, Pa.
Don Wallings, Clifton Heights, Pa.
A. I. Weidner, Arendtsville, Pa.

President Hiester called to order, and after the usual routine of reading and approval of minutes of previous meeting, and a recess of five minutes for enrollment of members, the following letter of welcome was presented:

The Fruit Growers Association of Adams County,
Flora Dale, Pa., January 16, 1906.

To State Horticultural Association of Pennsylvania, in Convention Assembled, Gettysburg, Pa.:

Gentlemen: The Fruit Growers Association of Adams Co., Pa., extend to you a hearty welcome to Adams county.

We wish to assure you of our interest in your work and hope that the sessions of your Convention may be full of pleasure and profit.

Trusting that you may again see fit to meet within our midst I have the honor to record myself, by order of this Association,

Very sincerely yours,

EDWIN C. TYSON,
Cor. Sec'ty.

The President responded briefly, thanking the Adams County Fruit Growers' Association for their cordial welcome as well as their hearty aid and co-operation in awakening an interest in the work of the State organization.

As Chairman of Committee on Legislation, Mr. Heister reported that an interview was held with the Governor on the question of creating a Division of Horticulture and Pomology in the Department of Agriculture, and that his excellency seemed to favor the enactment of such a law. In a subsequent interview his attitude on the subject seemed to have changed, and no further effort in that direction was made.

In the absence of Chairman Watts the following report was read by Mr. McMillan:

REPORT OF THE GENERAL FRUIT COMMITTEE.

As Chairman of the General Fruit Committee we want to thank all who have assisted in the furnishing of data for this report. Many who have contributed full notes are not members of the Horticultural Association and we wish to express our special appreciation to these whose services have been of great value.

THE 1905 APPLE CROP.

The apple crop the past season was a signal failure in about nine-tenths of the counties. Adams, Dauphin, Lancaster, Franklin, Bucks and York are the only counties reporting satisfactory crops, and all of the correspondents in these counties do not report full yields. From 75 to 100 per cent. yields are generally reported from the foregoing named counties, although several growers report much smaller crops. No entirely favorable report is made by any one in the other counties of the State.

Wherever the yield was good there was very little complaint regarding quality. Summer and fall varieties seem to have been less generally a failure than winter sorts.

A great diversity of reasons are given for the failure of the 1905 apple crop. The destruction of blossoms by late frosts is the most frequently mentioned cause of failure. The light crop was attributed by many to over-bearing last year, 1905 being the "off year." Neglect and poor care are mentioned frequently and the San José Scale gets its full share of the blame. Unfavorable climatic conditions at various periods, too much rain for successful spraying, the lack of blossoms and prevalence of canker worms for the past two or three years, are also subjects of complaint.

In reply to the question: "Is the crop profitable in your county?" four-fifths of the correspondents give an affirmative answer, and those who answer negatively generally attribute the lack of financial success to the poor care of orchards.

Four out of every five reports claim that the old orchards are dying rapidly and the same proportionate number of correspondents claim that very few new apple orchards were established the past year. These are most encouraging facts to those who have planted largely in recent years and also to those contemplating entering the business on a commercial scale. There never was such a favorable time

from a financial standpoint to start new apple orchards, and there need be no fear that the orchard will be too large, if proper varieties are selected and intelligent care given the trees. The San José Scale is the one great enemy that stands off the would-be planter, and the average tiller of the soil hesitates about planting on account of this pernicious pest, so that now is the opportunity for the skillful, confident fighters to plant trees by the thousand. Trees are dying and population is increasing, so that in all probability the markets of the future will require more fruit and pay better prices than in the past.

Several varieties of apples of comparatively recent introduction are mentioned as promising. Stayman's Winesap is evidently in the lead among the newer sorts. It has a number of enthusiastic advocates and judging from the data collected it is destined to be a great commercial apple. It is a winter apple, possessing many desirable points. It is a thrifty grower, coming into bearing early and yielding heavy crops of fruit of excellent flavor, highly colored when properly grown and of splendid keeping qualities. It has the reputation of being a more regular bearer than the Baldwin. Other varieties named as promising are Gano, Nero, Lankford, Stark, Walker's Beauty and Mammoth Black Twig.

As to the prevalent height of heading trees, there is a very wide range. In counties where apple culture is an important industry, as in Adams, York and Franklin counties, the trees are generally headed fairly low, say from three to four feet. But farmers and tillers of the soil who do not make a specialty of orcharding, head from five to ten feet from the ground so that teams can pass readily under the limbs without knocking off the San José Scale. The Lycoming county correspondent declares that the usual distance from the ground to the first limb is from ten to twelve feet. He is outdone by the correspondent from Montgomery county, who claims that fifteen feet is the prevalent height in his county. If the scale's favorite method of migration is walking it would have a long journey up the trunks of Montgomery county trees before finding good pasture.

PEARS.

The 1905 pear crop in this State was much below the average. The great majority of correspondents report a very small yield and no one a full crop except that the Keiffer in various localities, produced large yields. The President of our Association, Mr. Gabriel Hiester, reports that Lawrence gave a 10 per cent. yield, Bartlett 60 per cent., Seckel 75 per cent., and Kieffer 100 per cent. Nearly all correspondents state that the quality was poor or fair, while a number claim that the quality was good. In reply to the question, "What varieties are most profitable," Bartlett is decidedly in the lead, being favorably mentioned twice as often as Keiffer. This is encouraging to those endeavoring to produce quality instead of quantity. A comparison with reports of previous years regarding most profitable varieties indicates that the Kieffer is not as popular as formerly among commercial growers. Clapp's Favorite and Seckel stand next to Bartlett and Kieffer as money makers.

As to whether pear culture is a profitable industry in Pennsylvania, seven-eights of the correspondents take a negative position.

One prominent pear grower blames the Kieffer for this state of affairs and this variety, no doubt, reserves much of the blame. Twig blight is really the greatest barrier to pear culture. No spray or application of any kind will prevent or remedy this disease and its control is very uncertain, so that growers hesitate about making large plantations. Of course much can be done to check or prevent its ravages by inducing only a moderate wood growth instead of a vigorous development of wood, and by removing and destroying infested parts as soon as discovered. The San José Scale is a serious but controllable menace to pear culture in our State.

PEACHES.

The 1905 peach crop was much more generally successful than either apples or pears. The majority of growers report excellent yields while some refer to the crop as large or very large. Failures and short yields of peaches were the exception rather than the rule. Conditions were quite generally favorable, although brown rot was very destructive in some sections. The failures reported were due to the winter-killing of fruit buds, spring frosts, San José Scale and the yellows.

There seems to be considerable fluctuation in the minds of our correspondents regarding the profits of peach culture. Only a year ago there was a decided negative declaration in reply to the question: "Is peach culture profitable in your county." This year nearly all the writers who attempt to answer the question assert that the business is profitable. Reports indicate that the ravages of the yellows are on the decrease and this is very encouraging to peach growers. The San José Scale is doubtless the greatest pest of our peach orchards.

PLUMS.

Only four growers report large yields of plums the past season. The majority of the reports indicate a very light crop over most of the State. Conditions were not generally favorable for this fruit. The curculio is the most destructive enemy, although the San José Scale is playing havoc with many trees. Severe winters, spring frosts, black knot, blights and rot are mentioned as serious obstacles to the business.

There is a great diversity of opinions as to the desirability of the Japanese plums. The weight of the testimony is in favor of this class, although a number of growers condemn them for commercial purposes. The European varieties are more certain of satisfactory results. Several new varieties are mentioned, but no particular sort seems to be receiving special attention. D. C. Young, of McKean county, mentions Sultan and Burbank as worthy of cultivation.

QUINCES.

The quince is of little commercial importance in our State. Three-fourths of the correspondents think the outlook for quince culture is not encouraging. There is only a limited demand for the crop and most orchardists do not care to plant this fruit and give the care necessary to get satisfactory results. The blight is the most serious enemy.

CHERRIES.

Cherries are grown successfully in many counties of the State, and it is a profitable crop under favorable conditions. The mountainous counties afford the best conditions and the crop is very profitable in mountain localities affording good home markets. With suitable soils and climatic conditions the large sweet cherries of various classes are grown to perfection, while the sour cherries, as Early Richmond, are grown successfully, over the entire State. Every possible attempt should be made on all farms, however, to grow cherries of the finest quality for home consumption. Montmorency Large, Montmorency Ordinary, Gov. Wood, Black Tartarian and Yellow Spanish are mentioned the most frequently, except Early Richmond, which is the leading sour cherry grown in the State.

GRAPES.

Grape culture in Pennsylvania is of little commercial importance, except in Erie county, where it is grown on an extensive scale. Although the crop is not largely cultivated for market purposes, nearly every farm in the State has a few vines to supply fruit for home consumption, and with this purpose in view it deserves special attention. It is grown successfully in every county though soils and localities have much to do with the quality of their fruit. Black rot is doubtless the chief enemy, but the ravages of this disease can be prevented by thorough and intelligent spraying.

There should be a greater range in the selection of varieties for family purposes. Concord is planted more extensively than all other varieties combined, and this is a mistake when the object is to supply fruit for the home. We have no objection to file against the Concord as a market variety, but grapes of better quality should be more largely grown to meet the demands of the farmers' family. Concord is always reliable, and it should be planted on every farm, but not to the exclusion of grapes of superior merit. There should also be earlier and later ripening grapes than the Concord planted for family use. The following list of varieties might be suggested for planting in the family vineyard: Moore's Early, Campbell's Early, Worden, Concord, Niagara, Brilliant, Brighton, Delaware and Catawba.

SMALL FRUITS.

In reply to the question: "What varieties of strawberries pay best," twenty-five kinds are named. Bubach receives favorable mention the most frequently. In addition to Bubach, the following varieties are held in the highest esteem by our correspondents: Haverland, Sample, Clyde, Glen Mary, Wm. Belt, Gandy, Brandywine and Sharpless.

Cuthbert is very much in the lead as the best paying raspberry. This report agrees with the report made last year, that the red raspberries are more profitable in our State than the black caps, although many prefer the latter class for commercial culture. Gregg and Kansas are the most popular black caps.

Snyder blackberry is the leader for commercial purposes. Kittatinny, Erie, Eldorado, Early Harvest and Briton are named as profitable varieties. The cultivation of small fruits is on the decrease instead of an increase, if reports indicate the present state of this

industry. This is a lamentable fact when we consider the excellent markets of our State. Western Pennsylvania is particularly blessed with fine markets for all kinds of small fruits, but the markets are mostly supplied with berries shipped from other states.

VEGETABLES.

There are numerous enemies to the production of various classes of vegetables, yet most of these pests may be controlled by spraying or by other means. The market gardeners of the State have no serious menaces to contend with, such as the San José Scale is to the fruit industry. A long list of vegetables are designated as profitable whenever market conditions are favorable. The potato is the most generally grown and is universally regarded as a profitable crop, yet many of our markets are mostly supplied by other states. This is a serious mistake of Pennsylvania farmers. Thousands of acres of land in the State are well adapted to potato culture and there is no good reason why we should not produce a much larger quantity of this standard vegetable. Immense quantities of early and late cabbages are shipped into the State, notwithstanding the fact that this vegetable is easily grown in every county and does not require the special physical conditions of soil that many other vegetables do. The markets in the western part of the State consume thousands of tons of cabbage, practically all shipped from other States, and which could readily be produced in this section of the State. There are many splendid opportunities to grow early tomatoes for home markets as well as many other kinds of vegetables as onions, celery, sweet corn, beets, lettuce, etc. There is need of a great awakening of the farmers of the State as to their opportunities for growing and marketing all kinds of garden crops.

SPRAYING.

Three-fourths of the correspondents report that spraying is on the increase and that when the work is performed in a thorough and intelligent manner the results are nearly always satisfactory. This is one of the strongest evidences of horticultural progress in our State. Spraying is now regarded as an essential operation in orcharding, just as important as pruning, fertilizing and cultivating.

THE SAN JOSE SCALE.

The San José Scale is the most popular insect in Pennsylvania. It is a favorite subject for discussion in the agricultural papers, at farmers institutes and at horticultural meetings. Nearly all correspondents report its presence in their respective counties and its ravages are universally feared. Great losses have already been sustained and a number of growers believe that its destructive work will be much more noticeable during the next two or three years. Thousands of trees have been killed and many more thousands are so badly infested that it is simply a question of time until the trees must succumb unless effectually sprayed before the advent of warm weather, when the work of destruction will continue with increased force.

Commercial growers are protecting their trees by spraying, generally with lime, salt and sulphur and the results have been, as a

rule, very effective in controlling the scale. But the great mass of tree owners are doing nothing to check the ravages of the scale and a vast majority of farmers do not know the scale, to say nothing of preventing its ravages. It is believed that the educational work being done by Prof. Surface and his co-laborers will be highly effective in encouraging a general warfare against the scale. It is purely a work of education, and while Prof. Surface is teaching the people what the scale is and how to kill it, every possible means should be employed to emphasize the value and importance of a full line of fruit trees on our farms, to furnish an abundant supply of fruit for home consumption if not for market purposes. We hope the time will never come when fruit culture will be limited entirely to commercial growers who will furnish general farmers with all the fruits they need for family use.

FERTILIZERS.

The use of commercial fertilizers is practically limited to specialists or those growing fruits and vegetables on a large scale. It is very rarely that fertilizers of any kind, except barn-yard manure, is applied to the farm orchards of the State. The fertilizer usually employed by Mr. Gabriel Hiester, President of this Association, contains about 6 per cent. phosphoric acid and 14 per cent. potash. Mr. Snavely of Lebanon uses a mixture containing 300 pounds muriate of potash, 400 pounds 14 per cent. rock phosphate and 300 pounds of steamed bone. When crimson clover or other legumes are grown successfully as cover crops, sowing about mid-summer, there is little or no necessity for using nitrogen in any form or even the application of barn-yard manure.

TILLAGE.

Orchard tillage is not generally practiced except by commercial growers. The benefits of tillage, especially in the early development of the trees, is conceded by all. A favorite practice in bearing orchards is to cultivate at frequent intervals until about mid-summer, then sow cover crops, preferably legumes, as crimson clover or cow peas which are plowed under the following spring and the ground harrowed until time to sow the cover crop again. An excellent plan for the young orchard is to grow vegetables or small fruits between the trees, using fertilizers liberally so that the trees do not suffer from an insufficient supply of plant food.

SCHOOLS.

There is room for great improvement in the rural schools of the State, particularly in their relation to country life. Nature study receives more attention than formerly but the work is not usually conducted in an intelligent and enthusiastic manner. The fact is that a large percentage of our country school teachers are not in sympathy with the work and life of our farmers, and when this is the case we cannot expect them to stimulate in the minds of the children any real interest in the great wonders of nature. Elementary agriculture is not taught at all, or not enough to be worth mentioning. The school grounds are seldom planted in a tasteful manner and receive little care. These conditions are not right and it is hoped that the Pennsylvania Horticultural Association and all kindred societies of the State will do their utmost for the improvement

of our country schools. While many other states are enacting laws relating to the teaching of nature study and elementary agriculture in their schools, Pennsylvania is absolutely inactive along these lines.

THE GREAT NEED OF PENNSYLVANIA HORTICULTURE.

There is a great range of opinions covering this question and some of the needs as expressed by our correspondents are as follows: "Education," "better teachers in the country schools," "how to spray and eradicate the San José Scale," "thoroughness in horticultural operations," "brains," "vim," "brains and perseverance," "intelligent, enthusiastic men to engage in the business," "intelligence and grit," "a general awakening to the fact that careful attention will produce profitable results," "a suitable school curriculum." Most of the correspondents believe that education is the greatest need. Mr. D. C. Young, of McKean county, says the greatest need is "some Moses to lead us out of the wilderness."

R. L. WATTS,
Chairman General Fruit Committee.

The following "sub reports" are submitted for publication as containing much valuable and practical information.

R. L. W.

AUSTIN WRIGHT, Bedford Co.—The general outlook for extensive orcharding has not been as good as in the past few years, partly on account of the presence of scale in many localities where it was not suspected to exist. Orchardists, and the home planter are awakening to the destructive aspects of the future spread of scale and other pests and diseases, and a general education of the people by authority of the State is expected to show good results in the near future. We have not had any experience in testing new fruits in this county except by a very few planters who have not yet arrived at definite conclusions as to merits or demerits of some new creations.

THEODORE DAY, Wayne Co.—One reason why we have had three years of full apple crops, and in some orchards a fourth full crop, is the absence of leaf-eating caterpillers and worms. I knew a disease destroyed the May feeding tent caterpillars over 40 years ago, and again some 20 years later, and found the same disease working in a small orchard in Columbia county, and learned to spread it, and saw the destruction of those caterpillars for miles. Fall web worms that were extremely abundant there, also disappeared like magic; and a trip out that way last fall showed me that a worm that built the most complete and perfect tent of all, on scrub oak, had also disappeared. I had this disease introduced in three townships in this county, and in one place I placed it myself where forest space worms were eating vast quantities of leaves, with the result that they too have gone the same way. I saw a large colony of them the past summer dead and dying of the same caterpillar disease. These worms build no tent, but let themselves down by a web or thread. I wish to try, with a little help from others, to spread this disease next summer, where such worms are getting destructive, and also learn if it will destroy a few other kinds of leaf-eating insects, that spin webs for any purpose.

D. C. YOUNG, McKean Co.—The past two winters in this county have been something frightful. Two years ago we had exceedingly cold weather and many of the apple trees were injured and nearly all the pear trees were killed. Last winter was very cold and steady and nearly completed the work on orchards done the year before. I think they might have withstood the winter, but in May we had two or three very hard freezes just as the trees were beginning to blossom. The blossoms were nearly all killed and many of the leaves were killed and the trees did not put forth new leaves. Hundreds of trees have been cut down during the past year in this county, and if we have another winter like the past two, apple growing will be a thing of the past so far as McKean county is concerned. Heretofore it has been very profitable and the fruit has been of very fine quality. Pears have also been a profitable crop, but until new trees are planted and commence to bear we shall have no pears here.

The common sour cherries have done well and the winters did not seem to injure the trees. Fine strawberries are grown here and the flavor the best I have ever seen any place. The winter seems to have no effect on the strawberry plants. Raspberries and blackberries are not cultivated as wild ones grow here in profusion and there would be no sale for the cultivated berries. Currants do well here and if hellebore is used on the bushes, and kept free of worms, the crop of currants is always very good. Where Bordeaux Mixture has been used in spraying, especially upon potato vines, it has been very successful. In fact, it is almost necessary to use it in order to get a paying crop of potatoes.

We raise fine vegetables in this county, and of excellent flavor. In fact, have never seen nicer celery grown in any place than we get in our own gardens here.

GABRIEL HIESTER, Dauphin Co.—Your questions cover the ground so thoroughly that I have nothing to add. We have no commercial fruit growers in the county, except Mr. Simon and myself. Owing to the wet weather in June the leaf blight fungus got a hold on the foliage of the apple trees and neither liquid nor dust spray could dislodge it after it cleared up. So the apple trees lost their foliage prematurely, which left the fall apple smaller than usual and lacking in flavor. York Imperial seemed to be more resistant, and the foliage remained green until frost and the apples were fine. The trees were loaded to the ground.

J. NEWTON GLOVER, Union Co.—We had too much rain when cherries were ripe for them to keep. Either wet weather or blight caused plums and peaches to dry on trees before they were ripe. On peaches it was due in part to the yellows.

This is not a great fruit growing county, except for peach orchards of which a number have been planted on the thin soil, where they do well.

W. H. STOUT, Schuylkill Co.—The season was not favorable for fruit, apples yielded so heavy in 1904 that the trees did not produce many buds and a frost at blossoming time destroyed much of the bloom.

Scale is playing havoc with peaches particularly and is spreading at an alarming rate, many have it and are not aware of it, until pointed out.

We had an unusual wet season after June, so that rot and fungoids were prevalent, causing fruit rot, and potato blight, and the ground was evidently too wet for the potato beetle to pupate so none were seen this fall after about August, so there appears a compensating gain with losses sustained.

Field crops, excepting clover, were good throughout; corn the best in years.

There are very few apple orchards treated with any care, grain crops being grown, little attention given to care and cultivation, the rotation of grass, corn, oats and wheat being continued sometimes manured, and a few hundred pounds of 1-8-3 applied with grain. The result is moss covered, declining trees with dead branches and once in a great while a crop of inferior fruit.

The boom in peach tree planting with 6 or 8 years has exhausted itself and not many engage in it now, most experiments proving failures. To plant trees and trust in the Lord does not meet with success in fruit growing.

J. Q. ATKINSON, Montgomery Co.—My impression is that those who can successfully control the San José Scale will in the near future reap a rich reward for their labors in fruit growing. The lime, sulphur and salt mixture will destroy all scales covered by it. Careless spraying has been the chief cause of failure. There is no occasion to boil the mixture. Lime should be fresh, slaked with boiling water, kept covered and stirred and allowed to stand one and one-half hours. The liquid will then be precisely the same as if boiled, and thus saving one-half of time and fuel. Unless a remedy appears and is applied, or some unforseen change appears in conditions, all fruit trees will succumb to the pest, and in a short time. No new orchards are being planted in this county. There is not very much blight of late.

H. C. SNAVELY, Lebanon Co.—I combatted the San José Scale for three or four years, and by spraying trees carefully with the lime-sulphur-salt mixture, the pest can be held under control so that trees show vigor and produce good fruit.

Four years ago when I was abed and trees were not sprayed I lost a number of peach trees. Last spring we failed to spray all of the apple orchard because of a failure of force pump to reach me sooner and the forwardness of the season. Well, for results; where the orchard was sprayed the fruit was uniformly fine and the trees vigorous with healthy foilage. The unsprayed part, on the whole, brought a lot of fruit inferior in different degrees from fair to worthless, and trees in rather bad condition, due to the ravages of the scale louse. All these trees were sprayed in 1904, but the past summer seems to have been very favorable for the increase of the insect, more so than ever before. The best we can expect to do under existing conditions is to hold the pest under control.

So long as birds fly, winds blow and insects crawl, reinfestation is only a matter of time, unless all trees, shrubs and plants are so thoroughly treated that all the lice are destroyed. Thorough work will accomplish this and with the lime-sulphur-salt, but very few aim at thoroughness, while the majority do nothing until the scale and tree die together.

As to the use of so-called commercial fertilizers, would say I depend on them altogether, in connection with crimson clover.

The fertilizer used, consisting of 300 pounds muriate potash, 400 pounds rock phosphate and 300 pounds steamed bone, is for healthy, thrifty trees. Where growth is deficient more nitrogen must be used. For orchard work I regard nitrate of soda too soluable. Tankage is preferred, except where peaches or plums show a lack and promise a heavy yield.

A bearing tree should be fed for bud and fruit production, therefore judgment should be used in the application of too highly nitrogenous fertilizers. I think I must drop the crimson clover for a year or more in my peach orchards. The trees make too much wood. Sometimes as much as five feet. This is entirely too much.

For potatoes and small fruits I prefer the potash in the form of sulphate of potash.

Had the finest potato crop I ever raised. Eight acres of Carmen No. 3 made 2,000 bushels and nearly all marketable, a few too small and some too big.

Relative to saving the plums from rot when it rained almost constantly, would say that by keeping foliage, bark and fruit as much as possible covered with Bordeaux carries the crop through to maturity. This applies only to the domestica, for the Japan will not stand full strength Bordeaux. I mean the foliage, for it is as susceptible as the peach foliage.

The plum skin is smooth and sheds the Bordeaux at every rain, but this is not so material, for if the spores on foliage and bark are killed rot can be controlled. I might add though that this is not true of all plums. The Lombard will rot, spite of all I could do. The Gages are hard to mature.

I think this is a good time to plant all kinds of fruit trees, if the planter will observe a few things. First the adaptation of his land for fruit; second the selection of good varieties adapted to his locality; third, sufficient knowledge of the wants of trees as to cultivation and feeding; and lastly pluck to fight the fungous and insect foes that infest fruit trees and the fruit.

P. S. FENSTEMAKER, Lehigh Co.—I do not believe there are a half dozen persons in this county who understand the care of fruit trees in all its details. In the southern or southeast portion of our county there have been for ten or more years many many acres of fruit put out, principally peaches, and for a time large quantities of fine fruit was profitably grown, but since the necessity of spraying has become apparent, and of which they have very little knowledge and still less experience, there has been less interest of late shown in this branch. This is a very busy manufacturing section and cannot but prove to be a very profitable field for an up to date fruit grower and trucker. Thousands of dollars worth of fruit and truck are brought here in car loads, most of which could be grown right here in what is the best soil in the world. There are five wholesale dealers in this city, who do nothing but ship in this section fruit and truck which they sell to retailers. They each have from four to twelve teams continually delivering goods. What little fruit and truck that is raised here is grown by farmers and mostly sold to consumers and generally of inferior quality.

The CHAIR.—The report just read is now before the society for discussion. I would like to hear from our members on the subject of agricultural education.

MR. HARTMAN.—I consider this one of the most important subjects before the people today. The reason boys leave the farm is not far to seek. Only the branches necessary to a commercial education are usually taught, and boys are allowed to think farming a very slow institution. There are many solved and unsolved mysteries on the farm, and our schools should bring out the relation it bears to human affairs.

I would like the views of our members as to whether a young orchard is the proper place to grow small fruits.

The PRESIDENT.—I grew strawberries and raspberries in the orchard for about fifteen years, and do not think I could have put the ground to better use. The trees seemed to grow just as well and I do not think they sustained a particle of injury.

MR. BROWN.—It is the custom in Delaware to plant young peach orchards in berries, though we prefer not to plant on the tree rows, so as to save moisture. We usually fruit strawberries but one year. I am surprised to see Cuthbert raspberry so highly recommended in Pennsylvania. It is out of date on the Peninsula, and has been superseded by Miller, which is far superior in every respect. I do not like to see grain crops grown in young orchards as I frequently do in Pennsylvania.

MR. HARTMAN.—The quality of "Miller" is poor on my premises. My most profitable raspberry is "Turner" but it is rather soft for distant market.

MR. SWARTWOOD.—Cuthbert is the leading raspberry in Wyoming county. We have some trouble in procuring pickers.

MR. PACKARD.—I am sorry to see the question of agriculture in our schools lost sight of in these discussions. About three-fourths of the value of our exports to foreign countries is from our farms, and in this country will be fought out the problem and salvation of our rural homes.

MR. MOUDY.—I have an orchard of about 900 trees and have made $40.00 per acre in growing canteloupes between the rows. Best not to cultivate too near the trees to avoid bringing the feeding roots too near the surface.

Mr. HARTMAN.—The report just read stated that grapes are not generally grown except in Erie county. I planted about 100 vines several years ago and hope to find a profitable market.

MR. HIESTER.—Years ago many grapes were grown in Lancaster and York counties, but owing to Black-rot the vineyards were destroyed.

MR. BROWN.—Before leaving the discussion of this report of General Fruit Committee I want to commend it for its thoroughness and the valuable information that has been compiled from every section of the State. The first of these reports I ever heard was submitted

by Mr. Snavely of Lebanon, and was read at your annual meeting at Harrisburg, nine years ago, and it was one of the best I have ever listened to.

MR. HIESTER.—I heartily agree with Mr. Brown. I consider these reports better and fuller than any heard elsewhere or in any other state.

We have about completed our regular programme, and I will call upon Mr. Tyson for some information concerning the local society that has been organized in this county and of which he is an active member.

The following paper was read by Mr. Tyson.

THE FRUIT GROWERS' ASSOCIATION OF ADAMS COUNTY.

A Logical Outcome of the Fruit Growing Interests of the Community.

By CHESTER J. TYSON, Floradale, Pa.

Adams county, Penna., is bordered on the North and West by the South Mountain whose spurs and foot-hills break the adjoining county into numerous valleys with their well-drained, fertile slopes and interlying table lands. This comparatively narrow belt of land, with a few exceptions, comprises the fruit area of Adams county, varying from about three to ten miles in width and extending from York county to the Maryland line.

The soil of this district is quite varied; alternately and in some parts all jumbled together, we find red shale, gray and white flint, copper and iron stone. But whatever the soil, the hills are for the most part gravelly and the drainage is excellent.

For many years it has been known that this section was well suited to the growing of fruits, particularly apples and many fine old orchards have borne excellent fruit, doing their life work and passing away, to be replaced by others. Thus it has been for the past hundred years, but it was the same old story—a few fine apples, but not enough to attract the buyers. The volume of business was not here. Each grower was compelled to market his own fruit and through inexperience there was much loss. So the fruit industry did not grow. Early in the nineties, however, there was a general awakening all along the line and several large orchards were planted. From that time on, the enthusiasm increased, perhaps reaching its height about 1900. I say its height for about that time or a little earlier the San José Scale struck us and while the planting has continued, the timid ones have dropped out and it has been less general.

A census of the best known orchards of the district, taken nearly two years ago shows over 40,000 apple tress and nearly 26,000 peach. This means to-day not less than 50,000 apple for the district and fully

30,000 peach. Of the apple fully 75 per cent. are York Imperial. Other varieties are York Stripe, Ben Davis, Baldwin, Stark, Rome Beauty, a few Grimes Golden and many others. In the past year, some growers have top-grafted and planted quite largely to Stayman Winesap, but so far as I know, none have been fruited in this county.

Before passing, I want to say a word for the York Imperial. In a meeting of this kind we hear our old friend abused almost from start to finish. He is our first love, he is our money maker, and it hurts our feelings to hear him slandered and abused. Moreover I want to say right here that the man who classes York Imperial with Ben Davis never has eaten a well-colored, fully ripened York Imperial from the hills of old Adams, nor has he tasted York Imperials cooked as our Adams county wives can cook them; baked whole, the core removed, the cavity filled with sugar and a good sized lump of butter on the top, fit for the table of a king; stewed Yorks, the quarters whole and firm, yet perfectly tender and with a richness peculiar to the variety—better than canned peaches any day.

For the past ten or twelve years, buyers have been coming after our fruit and we now have a cash market for our apples right at home. Heretofore the peach crops have not been large, but if the trees that are now planted come into successful bearing, the peach buyer will be with us also. Our apples are becoming known in many markets and the past season buyers were sent here from Chicago especially for our York Imperials, to fill a demand that has grown up in that city. In this connection, the following figures for the season of 1905 may be of interest. Apples shipped from Adams county in barrels, 25,997 barrels; in bulk, 11,228 barrels; total shipped 37,225 barrels. Apples sold to evaporator, 10,670 barrels; to canning house, 2,400 barrels; together, 13,070 barrels, making a total sold in 1905 of 50,295 barrels, not counting the thousand of bushels made into cider. So much for the district and its products.

For the first few years we struggled along, each grower for himself; each one, except for occasional neighbourly advice fighting his own battles. But finally discouraged by the ravages of the San José Scale and by the heavy tolls levied from our crops by codling moth and many fungus troubles, fully realizing our individual weakness and the strength that united counsel and effort would bring to us, a meeting of the growers was called and on December 18th, 1903, was organized The Fruit Growers' Association of Adams County. This organization has for its object the encouragement of co-operation among fruit growers for the protection and advancement of their common interests.

Our work so far, has been for the most part along educational lines, and we who have been privileged to attend the meetings each month feel that much real good has come out of them. We are fully alive to the danger accompanying the presence of San José Scale in our orchards and few meetings pass without some discussion of ways and means for holding this pest in check. A few members of our Association have done some buying in a co-operative way and we are looking forward to the time when the organization may both buy and sell for the benefit of its members. It is our hope that through uniformity of package and strictest honesty in packing, the brand of our Association may become known and sought for in the markets of the world.

Our membership now numbers nearly eighty and we have started into the new year with the determination to make it one hundred.

In December, just past, occurred our first annual convention, a three day meeting, addressed by prominent scientific and practical men from our own and neighboring states. These men left with us many rich bits of advice and experience and their work was highly appreciated.

Our regular monthly meetings are held in the borough of Bendersville, on the second Saturday of each month and we shall always be more than glad to have anyone interested in fruit—be they producer or consumer—to meet with us and join in an exchange of views and experiences.

It is our earnest wish that fruit growers all other the State may visit us and that they may see in our work that which will encourage them to form, in their home communities, other Associations along similar lines. Let us go still farther and hope that some day these county associations may be brought together into a strong co-operative State organization and when that day comes, may we not also hope that the State Horticultural Society of Penna. shall form the foundation and center about which we may gather and build.

DR. KOONS.—I think the idea of organizing county societies and making them contributory to State organization, a very good one. This is a small gathering for a State society, and its membership and usefulness should be greatly extended by the organization of county and local societies in every county in the State.

PROF. SURFACE.—It has been well said that this is a small representation, for a State society, but withal there are many counties represented. This means that the gospel of good news will be carried to many homes, and become widely disseminated. Such organizations present many advantages to the fruit grower, one of the most important of which is buying and selling co-operatively, a matter of great importance. If horticultural or fruit grower's societies were organized in every county, meetings could be so arranged that lecturers and members could go from one to the other conveniently, thus ensuring a good attendance and continued interest. Experiences could be exchanged, reports of successes and failures compared, and interesting discussions brought out,

One of the great mistakes of our Pennsylvania fruit growers is the planting of too many varieties. Instead of 15 varieties of apples, I would not plant more than four if planting a commercial orchard. Many fail because of improper care of trees, and from a lack of knowledge of how to pick, store, pack and ship properly. We need to disseminate information along these lines if we hope to secure any standing for our fruit products in the markets of the world. I hope to see the example set by Adams, Berks and Wyoming counties, emulated by every county in the State.

MR. HIESTER.—We have with us Mr. Swartwood from Wyoming county, where they have recently organized a county society. We would like to hear from him.

MR. SWARTWOOD.—Our society is less than a year old and we have had but one meeting which was held in November last. I am

not prepared to say much about our organization, but since our meeting renewed interest is manifested in fruit growing, and more sprayers have been ordered since Prof. Surface and his assistants have given demonstrations in spraying.

DR. KOONS.—If in order, I move that the Chair appoint a committee of two or three in each county to endeavor to organize local societies, and have them report at next annual meeting.

PROF. SURFACE.—If that motion is carried I will do what I can to carry out the plan as far as possible. I hope the President will appoint a committee of three in each county to organize a county society.

MR. HIESTER.—We have with us a gentleman from Clinton county from whom we will be pleased to hear.

MR. BAIRD.—I am not prepared to make much of a report Conditions in our county one not very favorable owning to the presence of San José Scale. There are some small peach orchards in the county that are in fine condition, but not many have been planted during the last five years. There is one district there where there are about 10,000 peach trees, but outside of that there are only a few hundred in about a dozen orchards.

MR. BOYER.—In Snyder county the improved varieties of apples have not yet been very extensively planted. Although we grow York Imperial I have have never seen any so fine and so highly colored as those from Adams county. We grow about 25 per cent. York Imperial, 25 per cent. Baldwin, balance Spy, Winesap, Ben Davis and a few Smokehouse. Of peaches we grow more Salway than any other. Beer's Smock is a good bearer, but I have lost more money on this variety than any other.

MR. E. C. TYSON.—Is there any locality in Pennsylvania where pears are grown commercially?

DR. MAYER.—A great many are grown near Atglen, Chester county. They are almost exclusively Keiffer. I was informed that twenty-two carloads were shipped from there last season and nearly as many the previous year.

MR. McKAY.—If a man has a good orchard of Kieffer pear, and transportation is not too high, he will likely realize a good profit by putting them in cold storage. If not allowed to get too ripe they will keep well. The past season was an exceptional one for Kieffer pears. One man stored 2,500 baskets and sold them at $1.10 per bushel basket. Bartlett's brought from $6.00 to $9.00 per barrel.

MR. McSPARRAN.—What says Mr. McKay about York Imperial apples?

MR. McKAY.—I suppose they will bring three to four dollars per barrel in Philadelphia to-day. Stayman's Winesap will bring five dollars. "Nero" is from Delaware and is always ready sale. We also have Lawver and Nickajack, and some brought $18.00 per barrel, the highest price I ever saw realized for apples. I consider an apple orchard a good investment and any man who will plant 50 acres will

find the investment as good as a gold mine. There is generally a rise in the apple market in January. It is claimed by some that York Imperial does not keep well, but I find it keeps well in cold storage. Peaches and watermelons may be kept in cold storage, but soon lose flavor.

MR. WERTZ.—Don't you think there is more money in Ben Davis than any other variety of apple? I saw a commission merchant last fall who wanted 5,000 barrels of Ben Davis.

MR. McKAY.—Several years ago Ben Davis was higher in price than York Imperial, but it is not so now.

Mr. BROWN.—Ben Davis keeps better than any apple in the market. Buyers want them for that reason.

MR. WERTZ.—Under these conditions would you graft Stayman's Winesap on York Imperial and Jonathan?

MR. BROWN.—Mr. Wertz's Jonathan are as fine as I ever saw, and if I could grow them as fine as that, I would not grow anything else. One reason why Stayman's Winesap is taking the lead is because it has quality, like Grimes' Golden and Esopus Spitzenburg. The tree also grows vigorously and bears young. The demand for Grimes' Golden is great in New York, Philadelphia and Boston, for Thanksgiving and Christmas dinners. They want a quartette of turkey, cranberries, celery and Grimes' Golden apples.

The following committees were appointed by the Chair:

On Nominations.

W. F. McSparren, Thos Rakestraw, Jacob L. Rife.

Auditing Committee.

Edwin C. Tyson, A. I. Weidner, Dr. P. R. Koons.

Nomenclature and Exhibits.

A. N. Brown, D. C. Rupp, Dr. I. H. Mayer.

Delegates to Annual Meeting of State Board of Agriculture.

John F. Boyer, Prof. H. A. Surface, Enos B. Engle, Robert M. Elden, Chester J. Tyson.

The following letter from Secretary Critchfield was read by the Secretary:

Pennsylvania Department of Agriculture,
Harrisburg, January 15th, 1906.

Enos B. Engle, Esq., Secretary, Penna. State Horticultural Society,
Gettysburg, Penna.:

My Dear Sir: I have notice that hearings in prosecutions brought in Clinton and Centre counties for violations of feeding stuffs law have been set for the 16th inst., in Lock Haven and for the 17th inst., in Bellefonte. I shall be obliged to attend these hearings, so that, at almost the last moment, I find I shall not be able to be at Gettysburg meeting.

Please give to your Association assurance of the very high estimate placed by this Department upon its work and my personal appreciation of what the Association is doing for the Agriculture of the State.

Hoping that you may have a very pleasant and profitable session, I have the honor to be,

Very truly yours,

N. B. CRITCHFIELD,
Secretary of Agriculture.

Adjourned.

EVENING SESSION.

After President Hiester called the meeting to order Prof. Surface called the attention of his field demonstrators to the importance of using note books and pencil freely in noting varieties of fruits and other valuable points likely to come up during the sessions of our meetings.

The credentials of William H. Skillman, Bell Mead, New Jersey, President of New Jersey State Horticultural Society, as a delegate from said society, and of Peter R. Boltz, M. H. Snavely and John C. Troxell as delegates from the Lebanon county Agriculture and Horticultural Association, were presented and they were accorded the privilege of the floor.

ANNUAL ADDRESS OF THE PRESIDENT.

By GABRIEL HEISTER, Harrisburg, Pa.

In accordance with a time honored custom, our Secretary has placed on the programme at this time "President's Address."

I shall not attempt to make a lengthy or finished address, but there are a few things I would like to say.

First I want to thank you for the honor you have conferred upon me by making me your President. I assure you I do consider it an honor to occupy the chair that has been so ably filled by such men as Howard A. Chase, William H. Moon, Calvin Cooper, S. B. Hieges and Josiah Hoopes. When I leave the chair, if I can carry with me the respect, and esteem, the affectionate regard of the members as these men have done, I shall be fortunate indeed.

We are just now entering upon a period of great expansion in the fruit industry; from every section of this great country, north, south, east and west come reports of extensive orchard plantations; and not from this country alone, the same is true of nearly all the British colonies.

Fruit growing has passed out of the amateur stage, it is now a commercial proposition of large proportions.

Owing to the extensive home market afforded by our numerous mining and manufacturing towns, and excellent railroad facilities for reaching them, we in Pennsylvania have heretofore cared very little about the general market. Our fruit is practically unknown outside the borders of our State, although, according to the last census, we grow 24,000,000 bushels of apples, 500,000 bushels of peaches, and 434,000 bushels of pears annually, besides plums, grapes and small fruits in great abundance. Our own people consume this immense crop, and in addition many train loads of fruit are shipped in from New Jersey, Delaware, New York and Michigan. But we too are beginning to plant largely. The greatest activity is shown in this South Mountain district. I expect in the near future to see these hills covered with flourishing fruit trees, forming one large apple and peach orchard, extending from the Susquehanna at Harrisburg to the Maryland line, so that notwithstanding our excellent home market in a very short time large quantities of our fruits will be placed on the general market. We will then have to meet the competition of the whole fruit growing world. There are a few points we should bear in mind just at this time.

I. It is of the utmost importance that we plant our trees in the right place; that is, in deep, well drained soil, so that they may have a chance to do their best.

II. We should localize and centralize the different varieties, each where it has been known to develop its maximum quality.

Prof. Craig illustrates this point by refering to the quality of Gravenstein apples grown in the Anapolis Valley of Nova Scotia: "The quality of the fruit, coupled with its vigor and productiveness, has probably done more to advertise the fruit growing regions of Nova Scotia in the European world than any other factor. So also the Fameuse apple and its allies in the upper valley of the St. Lawrence. The Northern Spy in Western New York, near Lake Ontario," and I think we may also add the York Imperial in the South Mountain region of Pennsylvania.

In the Western and Southern states large corporations have been organized and heavily capitalized for the purpose of growing fruit. I believe, however, that in Pennsylvania fruit will be supplied not by the large corporations so much as by individual growers. Personally I have always been an advocate of the little farm well tilled. The percentage of profit is greater and the quality of the product usually better. But in order to compete in the general market with organized capital, these individual growers should co-operate in marketing their fruit; an organization should be effected in each fruit district. The prospective growers should carefully consider the proper locations for the various orchards. Then they should decide upon the varieties to be planted, and the whole district should confine itself to two or three, certainly not more than four varieties, that succeed perfectly in that place. They should then enter upon a careful systematic study of the markets at home and abroad, with a view to placing their product where it will be most highly appreciated.

They should make the same careful, systematic study of the dealers in the different markets, and select one man in each to handle their product. That selection should only be made after a careful personal investigation of men and methods on the ground. No money that is spent will yield a better percentage of profit than that which is spent in personally investigating the men who are to handle our crops. The fruit from each district should if possible be brought to a central packing house, and be packed under the direction of one expert packer.

Another important matter for the organization to consider is the proper disposal of windfalls and culls, by turning them into some kind of manufacturing product, and also the question of cold storage. It is now universally admitted that the most important matter connected with cold storage (next to having perfect fruit) is to get the fruit into the cold room at the earliest possible moment after it has taken from the tree.

My idea as to Horticultural organization—briefly stated—is this: each district should have its county society, which should be an organization for business, to meet at least once a month, preferably on the grounds of one of the members, taking each in turn, and there discuss all these questions of location and varieties, methods of pruning, cultivation and fertilization, insect pests, diseases, marketing, etc.

Then all of these county organizations should meet once a year as the State Society, and consider questions of interest to all parts of the State, such as legislation needed, the proper enforcement of the laws we have, the advance that has been made in science relating to Horticulture—and just here I would say it is of the utmost importance that we keep in close touch with the Experiment Stations, not only our own, but those of other states, that may be experimenting along Horticultural lines. The benefits they have already rendered us by giving us more accurate knowledge of our business in all its details can not be estimated in dollars and cents, and we shall need their aid all the more as the years go on.

In this connection I want to call your attention to a bill that has been introduced in the present Congress by Mr. Adams, of Wisconsin, providing for an increase in the annual appropriation to Experiment Stations.

The total appropriation involved this year for all the Stations in the United States together is $240,000. The Adams' bill provides for an annual increase in the appropriation until it shall reach the sum of $720,000. In view of the great benefit we have already received from the work of these Stations, and the large field still open for Agricultural investigation and experiment, I think we should give this measure our hearty support, not only as an organization, but as individuals.

Now I want to repeat here what I have said on several other occasions. If you want to see this society flourish, you must not depend entirely on your officers. They will do what they can, but the success of any organization depends upon the earnest, active endeavor of each individual member. We want every one interested in fruit or flowers or ornamental plants in the State to join with us, and we can have them if each member will make up his mind to bring all such in

his neighborhood with him to the next meeting. The question was asked at one of our meetings by a member, "What shall I tell my neighbors to induce them to come with me?" I should say, tell them it will pay them well to come and make the personal acquaintance of the leading fruit growers and nurserymen in the State; to make the personal acquaintance of our Experiment Station workers, hear them talk, ask them questions, join in the general discussion of all questions, and thus get in closer touch with all the men interested in Horticulture in the State.

Each year the demand seems to be growing for a standard fruit package for the whole country. The State of Maine has sent out a circular recommending a national convention for this purpose. It seems to me, owing to the different conditions existing in the different sections of this great country, a uniform package is impossible; but it would be a great advantage to us all if we could adopt a standard barrel and a standard box for the whole country; that is, fix by law the number of cubic inches a fruit barrel should contain, no matter what its shape, and the number of cubic inches a box should contain, no matter what its shape. Then we would have two standard measures, and would know exactly what was meant when we saw them quoted in the market reports.

While we are planting these large orchards for commercial purposes, let us not forget the all important matter of home adornment, ornamental planting around our country homes, and the fruit garden for home use; for what after all has a man in this world but his home, and who can have so pleasant a home, or enjoy more luxuries, than the fruit grower, if he lives up to his privileges?

THE BUSINESS OF THE SMALL FRUIT GROWER.

By H. W. COLLINGWOOD, Editor Rural New Yorker.

My title means the small grower, not necessarily the grower of small fruits. This is a day of big things, business has changed greatly in the past 50 years and will change still more. The old New England farmers used to wait for snow before making their annual trip from Vermont to the Boston market. They went with oxen and sleds, loading their wax, their wool, their maple sugar and whatever they had on it. Just before they started the housewife would boil a kettel full of thick bean soup. When boiled she stood the kettle out by the door over night until it froze solid. Then they poured water on the under side of the iron kettle and knocked out a cheese of frozen bean soup. They bored an augre hole through this and hung a chain through it and hung it behind the sled as they went to market. When they stopped for dinner they took a hatchet, chopped off a few slivers of the bean soup, melted it in a tin kettle over the fire and had their dinner. Thus having bean porridge hot and bean porridge cold and in some cases three weeks old. It is a long jump from this to our present system of distribution and sale.

Apples are now sent 3,000 miles from California to find a profitable market. Peaches and plums are brought all the way from South Africa. In thousands of neighborhoods where, when we were boys, meat supplies came from local farms, there is not even a slaughter house. Butchers are only meat cutters. The same distribution of vegetables and fruit is made from large growing centers, and this cuts into the local trade. I remember the time when demand and supply regulated the price of potatoes. If the American supply ran short there was no limit to the price. Twenty years ago I lived in a boarding house in Brooklyn, N. Y. It was a short potato year and the price went to $5.00 a barrel. I know that our landlady stopped buying at $4.00 and gave us boiled rice and corn meal instead of potatoes. Now, when the price reaches $2.75 the fact is at once known all over the world, and potatoes in Germany and Belgium may be taken from the alcohol factory and sent here for eating. They are good potatoes and have found their way into markets a hundred miles back from the sea shore. I speak of this to show how in many cases, what we call, our local markets have been taken away from us. This has discouraged some of our small growers, who think their business is being stamped out by the large concerns. I don't find this so in our country. The big grower can't get down to the retail customers as well as the small grower can. The more hands a package of fruit passes through the more the buyer will distrust it. The big man cannot give personal attention to every package, while the small grower can, and every year we are developing a more discriminating class of customers—they want the best. My experience is that while the present flood of fruit and vegetables will make it harder to sell ordinary goods in the local market, on the other hand it makes it possible to sell first class goods to better advantage. I find that customers like to see the bottom of the package and they like to be able to hold some one directly responsible. I do not fear the finest Georgia peaches or Delaware strawberries when I can pick my fruit after it has ripened on the tree and get it to the customer at once. I find more and more people who realize that the distant fruit has ripened in the car and they can be made to realize the difference. The one exception that I know of to this rule is the sale of California apples. As these come neatly packed and uniform in size and color they take our best trade. We must realize that the Californian growers would be ruined if they were to send fruit as carelessly packed as much that comes from nearby growers. At the same time it is true that many of our Eastern apples are just as good as the California fruit. The latter is packed by experts, who go from farm to farm, packing the boxes for shipment and putting the names on each box. A small grower must pack his fruit properly and stand by his name, that is the best asset he can have. In the old times when local trading was the rule a man went into a grocery store and bought five pounds of coffee. The grocer brought him the package and the man grew suspicious. He opened it before the crowd and found inside a stone weighing 15 ounces. He held it up before the crowd and the grocer put on his spectacles and looked at it carefully. "Why, yes;" he said, "I remember that, I found it in the last tub of butter you sold me and I thought I would send it back to you." In those days that sort of thing would not lose trade, but nowadays one

of your customers finding inferior goods in his package cannot get back at you in that way, without giving you a counterfeit dollar bill or a plugged quarter, which you would not accept.

The best location for a small grower is near some good sized town, for he must have some retail trade. A large town is better than a large city, unless there is a public market where a man can exhibit his own goods. A number of small growers can combine, if the can learn to trust one another and sell their produce at one place. A small grower selling at retail is often at a disadvantage for a year or two, until he makes a reputation and gives up a first class line of goods. I know some strawberry growers at Hilton, N. J., who have gained such a reputation for fine fruit that their berries sell at 18 and 20 cents a quart at wholesale. They seldom ever sell a quart at retail. This is unusual, but it shows the possibility of a good name. The local market is often neglected, people will not see what is close to them, being so eager to look beyond the end of their nose that they don't realize what a beautiful nose they have. I know a man in a country district of New York who makes a good living supplying farmers and people in little country towns with vegetables and fruit. These people learned that he was sure to have what they wanted and so they have quit planting gardens to a great extent. He sold them plants and then when the plants failed to grow he sold them the fruit and vegetables which ought to have been produced. I have been surprised to see what can be sold in my own country neighborhood by merely putting up a sign in front of the farm. We use a blackboard and chalk up the names of what we have to sell. Some people lack faith both in the local market and in themselves and they make no effort to develop either, when in reality the local market is the best there is.

There are two plans for the small grower. One is to attempt to grow a variety, a little of everything, so as to run a wagon and supply all vegetables. The other is to have a good general garden, which gives a fair surplus above the family needs, and put most of his work on two or three specialties. We tried the first for a while, but dropped it, as we never had enough of anything to make a really first class showing. We finally decided to put most of our work on strawberries and transplanted onions, with a surplus of everything in the general garden. This pays us better, though circumstances must decide what the average grower will do. I find that by having good supplies of strawberries of high quality we get a reputation and the strawberries will sell our other goods. Get a reputation for producing one thing well and people will remember you and call for your goods. We sow Prizetaker onions in the hot bed early, transplant the seedlings to rich soil and get enormous onions. People come for miles around to buy these big onions and it is an easy matter when they come to get the order for their winter supply of potatoes, apples, squash or turnips. Another thing that the small grower must look out for is to suit his crops to the soil. We grow the Marshall strawberry, as we think, nearly to perfection. Most people have discarded the Marshall, because it is a shy bearer, but on our heavy soil and hills it gives good satisfaction, yet you can see that I cannot safely recommend Marshall for general cultivation. Something of the same thing is true of other fruits. If we are going

to have the best we must find out which varieties will do best on our soil and also which plan of culture will give best results. It is not always safe to follow the rules we hear given too closely, for a man must work these things out for himself. I bought a farm of 90 acres, though I didn't need over thirty, yet this farm could not be separated. Ten acres is about our limit for gardening, the rest being hill land is planted to peach and apples in sod. I don't hesitate to say that our plan is to avoid work on most of the land, not entirely because we are lazy, but because the hired help question is a hard one, and we have tried to do what we can within the limit of our present family. I observe that many excellent men can do a good day's work alone, but cannot manage the labor of others to good advantage. As a rule hired labor does not pay them and they will do better to handle what they can with their own family. One great advantage I have found in growing two or three specialties is that any surplus from the retail trade will find a good market at wholesale. There will be enough to make a good shipment and it will be good There are some good partners that will help out a small grower in the sale of culls or inferior. It is usually a mistake to try and sell poor stuff to your regular customers, or to ship it away, better sell it at home. A small canning outfit can be made to pay well. A neighbor of mine puts up fruit and vegetables when the price goes down, selling the canned goods at a fair profit in winter. For a long time commercial canned goods were so plentiful and cheap that it was hard to dispose of the home made article. There is now great distrust in the cheaper canned goods and people are afraid of copper and salicylic acid and this feeling makes a possible market for honest goods. It often happens that good tomatoes, lima beans, sweet corn or small fruits are so low just when the goods are ripe that it is like giving them away to haul them off for sale. They can be put into cans if a fair outfit is provided and held until winter. A man in my neighborhoood had a big crop of peppers, which could hardly be given away. The family made a dressing and stuffed thousands of these peppers, selling them in the local city for several times the price of green peppers alone. Many of us have no idea of how markets and methods are changing. I know a man near New York, who was driven out of business, as an old farmer. There was a good spring of water on the farm, which for years had run uselessly away. This man's son dug out the spring, built it up and is selling the water to-day for more than some farmers back from the railroads get for their milk. There are other partners on the fruit farm. I find the hog and the hens useful. We keep hogs in the old orchard, which is in sod and headed high. These hogs tear up the sod and root and eat most of the wind-fall apples. I would rather have the hogs get them than to patronize the cider mill. We must feed the hogs some grain and keep wood ashes or bone before them or they will gnaw the trees. It is astonishing how much pork can be made out of the waste of the garden and fruit. A man who has worked up a retail trade for fruit and vegetables can easily dispose of sausages and small joints to his customers. We find the hog a most useful citizen in working over the manure. This winter we are using a good deal of sawdust for bedding and unless this is thoroughly worked over it will sour the

land. We shall use lime wherever it goes. I know some small growers who combine pure bred stock with their crops. As they cannot keep many head of stock they keep a few good ones. Some popular breed of hens or pure bred hogs can be made to pay if a man can attend to them. I think it pays best in this business to take some odd breed, for instance, Red Polled for cattle, Tunis for sheep, and the Essex or Tamworth for hogs. In this way a small breeder will not have to compete with large ones and the novelty of his stock will attract business to him, but no lazy man need apply for the job. To make a living in this way a man must also have a family of good size with some interest in his work. If the people inside the house are looking only for a nice easy time, without work, such a business cannot be made to succeed. Such a man must be a good salesman, quick to know what people want, a pleasant man to approach his customers and a good judge of prices, he must be thoroughly honest, so that people will trust him and know what his goods are before he shows them. A good supply of personal cards or circulars will help. They should be neatly printed and well gotten up and scattered broadcast over the country where he wants to sell his goods. The plant business may be combined with fruit growing, especially near a large town where people want to start a small strawberry patch or raspberry plantation in the back yard. A man can often do well by furnishing the plants and setting them himself for such people. I have briefly outlined some of the ways the small fruit grower can compare with the large one. He is not by any means in danger of being crushed out so long as he takes up the work in a business like way and sticks to it properly.

THE PRESIDENT.—We are fortunate in having with us Mr. A. N. Brown, of Wyoming, Delaware, who will discuss "The Three Systems of Orchard Management."

To the most casual observer it must be apparent that there are many systems of orchard management practiced by orchardists. In fact, much has been said or written upon this subject in recent years a very large majority of fruit growers still follow the paths their fathers trod, or hold some preconceived notion of their own, whether it be founded upon either scientific or practical facts. Again, we have another class who believe a fruit tree will bear no matter what the soil conditions, or what the treatment, providing weather conditions are favorable; and when a tree fails in yielding annually her increase it is due to the weather or that trees only bear on occasional adternate years. A careful study of the constituent elements of tree and fruit, and a knowledge of soil requirements at once proves the fallacy of all such systems or lack of systematic reasoning.

No matter what the methods of the past have been, or what the present are as practiced by many, my subject comprises the entire range of orchard management. There are practically only three systems, viz.—The Sod System—The Mulch System—and The Cultural System, and a brief discussion of these will by comparison, perhaps enable us to apply them, with some modifications suited to our several conditions and environments, profitably.

There is no study of nature so attractive, so inspiring or so elevating as the study of Fruits and Flowers; it enlarges man's views of creative wisdom as no other study can. And when we fully realize that a tree is only an instrument with great possibilities in the hands of man to mould, to form, through and by which to create the one product of universal desire and of universal health; in fact, to recognize a fruit tree as being a machine that will produce a product in accord with the kind of food and attention the tree received, we must first know the constituent elements of tree and fruit, and the best system by which these elements can be supplied.

As an illustration, a mature apple tree with a crop of fruit; that is to say, a tree fifteen to twenty years old, producing twenty bushels of apples will take from the soil 1.47 pounds nitrogen, 0.39 pounds phosphoric acid, 1.57 pounds potash; thus an acre of apples set 40 feet apart, which would give thirty-five trees to the acre, would require 51.5 pounds of nitrogen, 14.0 pounds of phosphoric acid and 55.0 pounds potash, necessary to grow the fruit, leaves and wood of a tree of mature age and producing an average crop of fruit. The commercial value of these plant food elements required to produce the crop of fruit as stated is $11.27. For the purpose of comparison, a crop of wheat, which will yield twenty bushels per acre will remove from the soil 39 pounds of nitrogen, 12 pounds phosphoric acid and 16 pounds potash, the commercial value of which is $7.25; showing that there is required to produce a crop of fruit $4.02 worth more of the necessary plant food elements, than that required to produce a crop of wheat. This is significant, in that few farmers at the present day would undertake to grow a crop of wheat without supplying to the soil, upon which that crop was to be grown the plant food elements that the crop required to the extent of the knowledge and ability of the person growing the crop to supply them. There are still two other important facts revealed by the study of this phase of the question, before we can intelligently consider the subject under consideration, viz.—the relatively small amount of phosphoric acid required as compared with that of nitrogen and potash, and the further fact that these plant food elements must be supplied in their proper ratio; an excess of one will not make up for the deficiency of the other; but experiments have shown that the crop can only be measured by the standard of a fully balanced ration. A deficiency in any one of the plant food elements lowers the ration to the extent of such deficiency, that these conclusions are correct and cannot be refuted is proven by the law of nature which controls in the animal kingdom, obtains in the vegetable world with equal force and effect, therefore, to produce a tree, which will bear every year and produce fruit of quality of the very highest attainment possible, we must feed the tree a perfectly full balanced ration of nitrogen, phosphoric acid and potash, keep the trees immune from the attacks of fungus and insect pests, supply the necessary moisture, prune so as to afford the sunlight reaching every leaf that that great mechanical force of all nature can perform its function, and then thin so as to preserve the vitality of the tree; and he who follows persistently this "dic-

tum" will be rewarded by fine, vigorous, healthy trees, bearing fruit of highest quality, and producing its fruit annually, barring only extreme weather conditions.

What are the three systems of orchard management and which will produce the best results for the practical orchardist with the most economy?

The Sod System, which has been mostly practiced in the past, and still has many adherents, has nothing to commend it other than that it saves labor or cultivating, binds washing soils and makes getting through the orchard with teams for gathering fruit, etc., easier, and saves much fallen fruit. But these apparent advantages are overcome by the many disadvantages; in the first place to grow the sod, which usually consists of timothy, red top, orchard or herd grass, requires 70 pounds of nitrogen, 18 pounds phosphoric acid and 77 pounds of potash, the commercial value of which is $15.25 and $11.27 worth of these elements are required to grow leaves, wood and fruit of the trees themselves, it will be seen that to grow this seed crop in addition to the trees, it would require the application of manure or fertilizer to the value of $26.52. But this is not the worst factor in the sod system; if in sod there is an impossibilty to control the wood growth and bud formation, and the storage in the tree of the necessary nitrogen, phosphoric acid and potash to develop and bring to full maturity the fruit because the moisture supply cannot be controlled. The cutting of the sod crop and not removing it is not effective with the growing crop thereon; so that the sod system is a faulty one from either a scientific or practical standpoint, and should only be practiced upon such locations as make the other systems impossible. The advocates of the sod system claim that fruit grown under such sytem will carry better than when grown under any other system. I will grant this, for the reason that such fruit is of low quality; high quality fruit being tender, breaking and juicy, will not stand rough handling, etc., or live as long.

The Mulch System differs from the Sod System in that the soil is cultivated and the mulch drawn on to the orchard, and in this way we secure all the benefits of the cultural system. Moisture, air, nutrification—wood and bud growth at the season that these should be made and storing into the tree all the necessary plant food elements to grow and fully mature the fruit; the difficulties of securing the amount of mulch required, because this system requires just as perfect and complete attention to details and thoroughness as other systems to be successful; this difficulty makes the mulch ystem on a large scale impracticable.

The Cultural System, practiced upon a thoroughly practical, and in accord with present knowledge of soils and tree and fruit physiology is suited to a greater variety of conditions and within the reach of every orchardist. This method, pusued as it should be, requires that orchards should be ploughed as early in the spring as the soil will permit, after ploughing they should be cultivated once a week with such implement as conditions require when cultivating is to be done; this continued each week until July 1st, to 10th, according to lateness or earliness of the season, and culture should be given twice a week in times of drought; when this cul-

ture should cease and the orchard seeded down to cow peas, crimson clover, soy beans or hairy vetch—these should be permitted to remain on the soil until following spring, when they should be ploughed under and this intense system of culture resumed. The advantages of this system are that you grow the wood and buds for the following season's crop in the early summer when they should be grown, and the culture ceases when it should cease to afford opportuntiy for this wood and buds to harden and fully mature before winter. Again, this cultural system makes it possible for the tree to store up all the necessary plant food elements to fully mature its fruit by the time the culture ceases. Again, the culture conserves the moisture, aerates the soil, and in pulverizing it exposes a larger surface to the action of the oxygen of the air; thus eliminating phosphoric acid and potash in the soil and putting it in condition for the operation of the feeding roots; without humus in the soil and constant culture to conserve the moisture and the fining of the soil it is impossible to maintain the moisture supply needed.

The Illinois experimental station has determined that the amount of moisture in soil cultivated as against soil not cultivated varies from 13 to 27 per cent., or the cultivated soil will contain in an acre 104,000 gallons to 153,000 gallons more water than the uncultivated soil. This added moisture, together with the air admitted into the soil by culture unlocks the phosphoric acid and potash and other mineral elements therein. The growing of legumes by their root system going deep into the soil aerates it, so that the plant food elements can also be eliminated. These crops improve the mechanical condition of the soil by filling it with vegetable matter and humus; this again makes soils alluvial or porous, admitting of the free passage of the soil waters, and retaining this water to be taken up by the tree as required, and lastly it must be remembered that a legume crop managed in this way in an orchard will give to each acre 203 pounds of nitrogen, 49 pounds of phosphoric acid and 202 pounds of potash, valued in the market to-day at $43.00. This amount of necessary plant food elements is therefore returned to the soil, less the amount required for the growth of the crop itself, and such as may be eliminated in this process of disintregation.

In comparing these systems it can therefore be seen that the intense cultural system not only supplies all natural requirements, and that by growing the legumes at the season when tree growth should cease and fruit maturity should be going forward, all nature's laws are being fulfilled, the necessary plant food supplied without any added artificial manures, and the economy and success of this method clearly recognized.

Dr. Warren, of the Cornell Station, shows that New York orchards tilled five years yielded 80 per cent. more fruit than orchards left in sod five years, where conditions were similar and substantially the same. The question, therefore, of adopting a system that will bring best results should be easy of solution. Location, conditions, environment will necessitate some modification of any system that may be adopted, but the principuls as I have indicated must be observed where regular annual crops of fruit of high quality are to be secured. The best evidence of the advance that American Horticulture has

made lies in the fact that we to-day control conditions surrounding fruit culture, instead of having conditions control us. The modern demand of the market for fruit is that it must be of highest quality; and fortunately for the fruit grower he can grow quality into his fruit by feeding his trees a full balanced ration, just as best results are obtained in a dairy herd, by the proper balanced feed; in either case the cow or the tree being the instrument in the hands of man to convert raw material into a manufactured product. In the degree that fruit growers will meet the requirements so clearly indicated by scientific investigation and practical experience, in that degree will Horticulture still further advance as the noblest occupation of man.

DR. MAYER.—Mr. Seeds at our Farmers' Institutes, recommends Cow-Horn Turnips and Essex Rape. Has any one tried them instead of Crimson Clover?

MR. BROWN.—I have used Cow-Horn Turnips and Vetch.

A MEMBER.—I do not attach much value to Cow-Horn Turnips. Twenty tons would not return more than $1.50 worth to the soil.

MR. PETERS.—I was much interested in Mr. Brown's address on orchard culture. He has, however, based his arguments on Delaware conditions, and not on the diversified conditions we have in Pennsylvania. As to sod culture, Mr. Brown mentions two men who have succeeded. I would advise every one to cultivate according to his particular soil and conditions.

MR. HIESTER.—We want to study and consider the principles Mr. Brown has spoken of, want to know what we are working for, then study our own conditions and apply them to our own farms and orchards. When I was young an old fruit grower told me to plow two feet deep before planting my orchard. I followed his advice and the trees grew finely but bore no fruit, and I was obliged to check their growth by sowing to wheat and timothy, at the rate of 10 quarts of the latter per acre, giving two crops of timothy per year for three years. The trees gradually stopped growing but had I checked the growth earlier I would have had less wood growth and more fruit. The treatment which I gave my trees would probably have killed Mr. Brown's in Delaware. I agree with Mr. Peters that we must study our own conditions and apply our own treatment accordingly.

RESOLUTIONS.

The following resolutions were read by the secretary and unanimously adopted:

"Resolved.—That the State Horticultural Association of Pennsylvania in annual convention assembled, hereby endorses the bill (H. R. 345) introduced into the House of Representatives by Hon. H. C.

Adams, of Wisconsin, to increase the national appropriations to the Agricultural Experiment Stations, and requests the representatives of Pennsylvania in the Senate and House to use their best efforts to secure its passage.

"Resolved.—That the secretary be instructed to send a copy of these resolutions to Hon. H. C. Adams, of Wisconsin, to Hon. James Wilson, Secretary of Agriculture, and to each Senator and Representative from Pennsylvania."

The following communication from the "Refrigerator Car Lines Committee," of "The National League of Commission Merchants of the United States" was read by the secretary:

"Chicago, Nov. 18, 1905.

"E. B. Engle, Secretary, State Horticultural Association of Pennsylvania, Waynesboro, Pa.:

"Dear Sir: Herewith please find the icing features of the rate bill prepared by the Refrigerator Car Lines Committee of the National League of Commission Merchants. These features have already been submitted to many individuals prominent in the producing and shipping of perishable products, and to many organizations of producers of said products and in every instance the said features have been unqualifiedly approved and urged for incorporation in whatever rate bill may ultimately pass Congress and meet the approval of the President.

"We trust the method herein set forth for controlling excessive icing charges which have become such an intolerable and unbearable burden to the producers of the perishable products of the country, may meet your unqualified approval also, and that you individually and your organization will by personal letters and appropriate organization action, at once signify such approval by writing individual letters and sending resolutions or other action of your organization to the chairman of the Refrigerator Car Lines Committee, John C. Scales, directing all communications to Washington, D. C.

"It is the intention of the full committee to meet in Washington in a very short time for conference and to meet with the President and the various members of Congress having rate bills in preparation, and we urgently ask you to at once take action, by sending resolutions, letters or telegrams, as all matter sent the chairman will be for use in Washington, in the struggle for relief of the producers of the perishable products of our country, from the intolerable burden of excessive icing charges they are now compelled to bear, bearing in mind the portentous fact that, if a rate bill is passed void of these icing features, it will be years (if ever) before the beneficiaries of unjust and excessive icing charges will permit an amendment to be carried through Congress covering the regulation of such charges.

"Yours most respectfully,

"JOHN C. SCALES, Chairman,
"Refrigerator Car Lines Committee.

"Icing Clause.

"Section 5. That a rate to provide for the furnishing of ice for the preservation of property requiring ice for its preservation when in transit shall be set forth in the published tariff of the carrier under the heading 'Icing Rate' and the said rate shall state the actual cost to the carrier of ice per ton placed in the car bunkers at the various initial and reicing points where ice is furnished or required, and the said actual cost shall be the rate.

"Section 6. That it shall be the duty of the carrier to place upon its freight bills the several quantities of ice furnished (if any) at the several icing points with cost as per rate, carrying the same to a column of totals.

"Section 7. That where delay occurs to a car or cars under refrigeration while in transit, and where such delay necessitates the furnishing of additional ice for preservation of contents, it shall in such case be obligatory upon the part of the carrier to furnish said ice, and the cost thereof shall be borne by the carrier.

"Section 8. That where the rate has been made with the view of carrying commodities under refrigeration without additional charge for such refrigeration (as in the case particularly of dairy products) sections 5 and 6 of this act shall not apply.

"Section 9. That if in publishing its icing rate a carrier shall publish a rate for icing other than the actual cost to the carrier per ton, placed in the car bunkers, or shall charge upon its freight bills other than the actual quantity placed in the bunkers, or if a carrier shall by any secret arrangement, understanding or otherwise, either directly or indirectly, enter into collusion with any party or parties whereby a fictitious price can be or is put upon the cost of ice furnished for refrigeration of its own or cars of other carriers, the said carrier shall, for each and every such offense, be fined five thousand dollars ($5,000.00), and five hundred dollars ($500.00) for each day of the continuance of such offense."

MR. BROWN.—I think this society should lend its aid to this movement. The icing charges of the private car lines are almost prohibitory and should be regulated by law or by the Inter-State Commerce Commission. I offer the following resolution and move its adoption:

"Resolved.—That this association heartily commends the work of the Refrigerator Car Lines Committee of the National League of Commission Merchants respecting the icing car features of the rate bill prepared by said committee, and approve and urge their incorporation in whatever rate bill may ultimately pass Congress and be approved by the President."

The resolution was adopted as read, whereupon the association adjourned.

MORNING SESSION.

Wednesday, January 17.

After calling the meeting to order the President announced that a photograph of the society will be taken at the close of the morning session at the court house front. All invited.

The following question from the Query Box was answered by Prof. Surface:

"WHAT IS THE BEST METHOD TO PREVENT MICE FROM GIRDLING TREES?"

PROF. SURFACE.—The subject of preventing mice from eating trees is one of great importance because thousands of trees are lost by mice in this State and I know of one fruit grower in Cumberland county who lost $2,000 worth of young trees, 5 or 6 years old, last winter.

I could at this time mention 20 suggested remedies but shall refer to only a few of the best.

In the first place, remove the cause of the trouble. That is the grass, weeds and rubbish on the ground. They are attracted by this material in which they find both food and concealment, and which should be removed most carefully in the fall, or better, the orchard should be so cultivated that there will be no accumulation of vegetation on the ground around the trees in winter.

Second. Mice feed almost wholly beneath the snow and generally only when there is snow on the ground, consequently one of the best measures is to pack the snow around the trunk of the trees, as they will not burrow through the ice pack thus formed and will not come on top of the trampled snow to feed.

The chief pest is the short-tailed meadow mouse or Vole. It feeds almost entirely upon vegetation. Its enemies are the owls, hawks, especially the red tail hawk, the screech owl and the black snake, especially during the summer and the latter part of the year.

These enemies to the mice should be preserved as they have no obnoxious habits. It is important to suppress all such pests by encouraging and preserving the natural enemies that are at work on them at all times of the year.

A direct remedy for this pest consists in tying bands of wire cloth, once or twice around the trees extending down beneath the ground and to the heighth of about two feet.

Another good remedy is to mound the trees to the height of at least a foot in the fall before the ground freezes and the mice will not come out to feed on top of the mound.

A third practical remedy is tramping the snow.

The fourth consists in poisoning them with any kind of poisoned food that they will eat.

A fifth which is a prevention to both mice and rabbits is to paint the trunks of the trees with whitelead and linseed oil, which is also a preventative against borers.

Mr. Tyson has made some extensive experiments in painting trees with this material and he reports good success. I should be glad if he would give this audience the results of his work along this line.

MR. TYSON.—Two years ago we painted 150 trees as an experiment, using pure whitelead and linseed oil. Results were favorable and one year ago we painted the balance of our orchard, 6,000 trees. Of these, 3 were girdled and a few were gnawed a little, but no apparent damage was done, and trees are doing well. The paint also proved a remedy against borers. We used the paint a little thicker than it is usually applied for second coat work, and painted trees about 18 inches high. An active person could paint about 300 to 400 trees per day. The trees painted were apple. Have never tried it on peach. Raw linseed oil should always be used.

PROF. SURFACE.—This accords with the experience of Prof. Allwood, of Virginia, who tried paint on different varieties of trees with no ill effect.

MR. HIESTER.—I gave Prof. Surface the privilege of painting some of my trees and saw no ill effects.

MR. WEIDNER.—A gentleman near me states that he has tried paint on peach trees, with same result as Mr. Hiester.

SAN JOSE SCALE.

The following remarks and papers by Prof. Surface, Economic Zoologist, and several of his office and field assistants, set forth in a practical way the latest efforts and experiments that are being made by the State for the suppression of this destructive pest:

SAN JOSE SCALE. "HOW IT TRAVELS."

By PROF. H. A. SURFACE, Economic Zoologist, Harrisburg, Pa.

The day has passed when it is necessary for expert fruit growers, meeting in a society of this kind, to discuss the subject of the best remedies for the San José Scale, or the possible effects of oils, fumigation, or certain solutions upon either trees or pests. These things are now fairly well established, and we are ready to move to a higher plane and discuss such subjects as some of the details of the life or rate of spread of this pest.

A year ago a paper, presented before this association, contained the statement that during the past several years the scale had not spread more than a few yards. Last fall in the vicinity of the writer of that paper we found he was mistaken, as we could trace its spread from his premises to a distance of two or three miles or more; but general statements of this kind are not as valuable as specific details of what has been found by men making a careful examination over a country of considerable area. As a type of such work, I wish to read from a written report recently sent me by Mr. Charles A. Heiss, our inspector and demonstrator in Centre and Clearfield counties.

Under date of December 5th he wrote as follows. "Yesterday morning I again inspected carefully the premises of Mr. G. and found that both large and small trees of his premises were generally infested, but in the rear of his lot were two peach trees about six years of age which were very badly covered. From there I went to the peach orchard of C. B., about one mile southeast of here, containing about 1,100 trees, ranging from two to four years of age. I could detect no "Scale" until I came to a tree in the middle of the orchard about three years of age and this was completely covered. Then I inspected around this tree and found the Scale had spread in a radius of four rods from this tree in numbers decreasing as the distance from the tree increased. From all appearances this tree may have been infested from the nursery."

The above sentence shows that since the other trees, which consisted of pear, apple, peach, and plum were only generally infested but not badly covered, the two peach trees mentioned were very evidently the source of the infestation on these premises.

"In another orchard belonging to the same man I found a repetition of the above conditions. Next I went into the peach orchards of W. E. B., one mile south of R. This man has probably 500 trees in three orchards. About his home he has a number of Japanese plum trees. These may range from seven to ten years of age and are infested more or less with Scale but not enough to make it probable that they came thus from the nursery. In the middle of a young apple orchard on the opposite side of the fence I found a number of young apple trees slightly infested. Now close about these trees was absolutely no bad case of infestation and the closest was one tree at least ten rods away, which shows that it must have been carried from there by some bird or insect. Large trees, probably twenty-five years of age were also slightly infested."

Certainly the badly infested tree mentioned above carried the Scale from the nursery, and since this orchard was about three years of age, we are safe in saying that the Scale spread over an area of a circle with a diameter of about 135 feet in three years' time, for a general infestation, and doubtless was carried to some extent to even greater distances. How very important it was that one of our Inspectors should find this spot and show the method of eliminating the Scale here before this fine young orchard was destroyed. This emphasizes the fact that our work, as State Zoologist, to be effective for the fruit growers of this State, must be three-fold: (1) Preventing the spread of the San José Scale from nurseries; (2) detecting

its presence where orchardists do not expect it, as in this example; and (3) teaching owners how to overcome it or suppress it, as is done by our practical demonstrations.

"On the opposite side of the block of plum trees spoken of above about two rods distant was a peach orchard of about 200 trees which may have been about seven or eight years of age. This orchard was thoroughly infested throughout and I could not tell where the origin was."

The above portion of his report shows conclusively that the Scale was carried to a great many trees during a few years from some originally infested trees, at least ten rods away. Certainly it was absolutely impossible for the Scale to crawl from these originally infested trees to the others and produce such effects. The conclusion that it was carried by some bird or insect must be correct, unless one can conceive that it was blown by a very strong wind, as by whirlwind, which is possible—but improbable.

"South of this and separated by a strip of woodland probably twenty rods wide is another peach orchard belonging to this same man, containing about 250 trees. This orchard is situated on a mountain side and is surrounded on three sides by dense forest. No sign of the Scale was found except quite a distance up the mountain side, near the edge of the woods, there was a four-year-old tree which had only one limb on the side toward the forest badly infested. The remainder of the tree was only slightly infested and the trunk was almost clean, showing that the first infestation must have been started on this tree by a bird alighting on the branch nearest the forest. Again the spread of a radius of from two to four rods of slight infestation was found around this tree but no other point in the orchard."

This point shows decidedly that in those regions where the San José Scale is bad and generally distributed it is impossible to work out such interesting points as this report contains. This locality was especially valuable for the purposes which we had in mind.

"In the orchard of J. M., two miles west of here, containing 450 to 500 peach trees, I could find no Scale.

"This morning I made an inspection of the town and found it to be in a very bad state, probably the worst of any town I have yet been in. Trees fifty years of age, as well as young trees, grape vines, and quince bushes are covered with it. So bad is it indeed that many trees were dead and the bark of many others cracking open, and last summer's growth shriveling up, and it was impossible to tell which was the worst infested tree. However, proving that the Scale does travel across lots in spite of Doctor G's statement that it does not, I went into the field of A. N. C., one-half mile west of P. O., and at least 100 rods from any trees, and there I found about six good-sized apple trees infested with the Scale."

From the fact that Mr. Heiss found the Scale covering a branch of the tree but not the trunk, he is justified in his conclusion that the Scale was carried to this particular branch, doubtless by a bird, and that it started at this place. It must have been there not more than a year, or the trunk itself would have been covered. Thus in this case we have evidence of the spread of the scale over a circle of at least a diameter of eight rods or over 130 feet within the year,

and, of course, the rate of spread would become much larger as the infested area increased in extent. It is possible that a few individual Scales were carried a much greater distance; but, of ocurse, an inspector cannot be expected to find all the pests, especially when they are so small and are likely to find concealment beneath buds and scales. This portion of the report is remarkable as it proves conclusively that the Scale was carried here, at least ten rods or 165 feet, from one orchard to another over a strip of woodland.

"To find how far it had traveled I took a trip of about six miles east of here and could trace the Scale for a distance of three miles from town, although no trees, except one about a mile from town, were badly infested. The remainder of the infestation at a distance of two to three miles from town had apparently just started this summer and so far as I could find was entirely removed from any case of serious infestation and on such trees upon which it could not have come from the nursery. Beyond three miles I could find nothing, except in a newly started peach orchard six miles east of here, where I found one small peach tree covered and this one without doubt came from the nursery."

The fact that these trees were of large size proves that they were infested by the Scale that was carried to them, because they would yet be comparatively small trees even if they were the very first infested with Scale that were brought into this State, as it has not been with us more than about twelve years and is consequently found only upon small trees, unless it be where it was carried from younger trees to the older ones. As they stood at least ten rods from the badly infested trees it shows conclusively that the Scale was carried this distance, or nearly a third of a mile. This gives full justification for establishing the half mile as a limit within which the Scale must be held in complete check around nurseries to avoid infestation of nursery stock, as is required by the State of New York.

"The name of the agent who sold these trees and who has the large part of the trade in this section is ————————. Following this I went west and north and found that the Scale was there also. I went north about three-fourths of a mile and found it on trees fifty years of age with no signs of badly infested young trees."

No better proof is needed in finding the Scale on trees fifty years of age, and no infested young trees nearer than three-fourth of a mile, that the Scale was carried or spread over this entire distance.

This valuable portion of the report shows that the Scale has spread from the original center over a distance of at least three miles, and it also emphasizes the importance of the work of inspection and demonstration which we are doing, and shows the ability of the class of men whom we have engaged as demonstrators, notwithstanding the fact that a self-appointed critic thought it wise to refer to them as "experts of a month's training." While we do not advocate destroying infested trees as in special cases, the destruction of the isolated infested trees is important in such cases as the last mentioned, in order to prevent the spread of the Scale from these small centers of distribution.

"Then I went one mile west of the town and found the Scale in the peach orchard of J. P. G. This orchard is from three to four years

of age and after a thorough inspection I could detect not one badly infested tree but at short intervals I found branches with the Scale thinly scattered over them showing beyond doubt that some foreign body had carried it there.

"These same conditions I found to prevail in two other orchards near here.

"In addition to this I made a trip to ———— and found that these people were not behind the times and had already made the Scale a common study in their town. Here I received an application for a demonstration to be held next spring in the orchard of R. B. This orchard contains about 3,000 trees and is a splendid place for a demonstration. I send the application herewith. The people of ———————— are enthusiastic over the work and are spraying and ordering pumps."

There is here such plain evidence that the Scale is carried by such means as birds flying from tree to tree and branch to branch, that no one can longer doubt it. In the light of these facts the paper presented to this Society a year ago stating that the writer believed that the Scales spread chiefly by crawling from one tree to another is too erroneous to command further attention.

The concluding paragraph of Mr. Heiss is one of the most encouraging possible, because it shows that the citizens in this infested region are awakening to the importance of the work the State is offering them, and will certainly soon overcome the enemy that has caused them such trouble. Demonstrations will be given this spring in that region, and there is evidence that there at least we have friends who fully appreciate our efforts in their behalf. I had intended more fully to discuss the paper that was presented before this Association last spring and which did not meet with the views of members, but even though I asked the writer to be present at this time and defend his points if he could prove them, he is not here, and I consequently prefer not to discuss it without giving him a fair chance.

ORGANIZATION OF THE SAN JOSE SCALE WORK BY THE DIVISION OF ZOOLOGY IN PENNSYLVANIA.

By N. G. MILLER, Assistant Economic Zoologist.

When it became certain that an effort was to be made looking toward the suppression of the San José Scale in this State, it became very evident to those in authority that the only method to pursue was to inaugurate a campaign of education as planned and urged by Professor Surface, rather than arbitrarily to lay down certain means of treatment and to force citizens to act accordingly. It was obvious that such treatment could not be put into universal practice, and without this it would, in a case of this kind, be useless.

The question then was, what should be the nature of this educational campaign? What means and methods should be laid before the citizens of the State, and how? These facts were very apparent:

(1) As a general rule the people did not understand the nature of the San José Scale well enough to act for themselves, except in a few localities in a few counties of the southern part of the State.

(2) In but a few localities were the means of combating the Scale well enough understood to be successfully applied by the persons themselves interested. People who understand the nature of the insect did not know the methods to be applied, and were at the mercy of the agents of either unscrupulous or well-meaning but misguided manufacturers. Thus it was obvious that the first effort in the work should be expended along the line of instructing those interested in the best known materials and methods to be used in combating this most injurious insect, and the proper time when this should be done.

The question then arose as to what was the best method. There are two general methods in practical use: 1st, Fumigation with a gas, like Hydro-cyanic Acid gas (HCN), which is death to all animal life; 2nd, Spraying or washing with some liquid material that will kill or injure by actually coming into contact with the body of the insect.

At first thought fumigation would seem to be the more effective of the two, for assuming that we have a gas and a liquid of equal deadliness to a given organism, the fact that the gas will diffuse evenly throughout any enclosure and penetrate where the liquid will not, should make the gas the more effective. For this reason HCN gas, being the most deadly, is the most effective insecticide known, and is used generally in nursery fumigation where the San José Scale is present, on stock that can be put into a tight fumigating house.

There is, however, quite a difference in the practical work of fumigating nursery stock or even small growing shrubs on the one hand, and orchard trees on the other. The first essential in this work is a gas-tight enclosure. Where trees and shrubs can be easily taken from the ground, and in the course of events, are so removed, this is a simple matter. In this case all that is necessary is that they be placed in such an enclosure and the gas generated therein. When orchard trees are concerned, however, it is necessary to enclose the trees instead of placing the latter in an enclosure. This has been attempted in a number of instances, and although quite successful from an effective standpoint, yet the cost of outfit and labor and unwieldliness of equipment has caused its early abandonment in practically every instance where tried outside the citrus fruit belt of California.

It was with the object of securing data, showing the relative cost, rapidity, effectiveness, and injury (if any) to trees, that a series of experiments in orchard fumigation were started some months ago by the Division of Zoology of the Pa. Department of Agriculture, and will be continued for some time. The general outline of the work was as follows: Several blocks of young trees from three to ten years of age, consisting of apple, pear, peach and plum, were selected. Box frames were erected, having one side removable, covered with tar paper and of such weight that they could be readily carried from tree to tree. These were shoved over the tree by opening the removable side, the computed amount of

matrials placed therein, the gas started to generate and the openings immediately closed for half an hour. This gas was applied at the rate of 20, 30, 40, 50 and 80 grams of Potassium Cyanide for 100 cubic feet of contents. The normal dosage in nursery stock is 30 grams per 100 cubic feet, but it was found that at the lower strength, 20 grams per 100 cubic feet, every scale was killed. At the normal dosage the cost of materials was about 5 cents each for trees of 8 years, but the cost increases in proportion to the cubic contents of the enclosures, which must have their outer walls larger than the dimensions of the trees to be treated. The first cost of apparatus is represented by the material and construction of four boxes, as described, costing about four dollars each, a total cost of sixteen dollars. Using four such boxes and three men working, about seventy trees could be treated in a day of eight hours. This cost of labor will raise the entire cost of treatment to about 10 cents each for trees of the size stated above. As in the case of cost of material for making the gas, the outlay for enclosures will increase in proportion to the height and diameter of the trees. At this early date it cannot be definitely stated if the trees were in any way injured. However, we feel certain that they are not, for we have yet to find the first instance of injury to fruit or orchard trees from HCN fumigation where even as much as three times the normal dosage was used. It has repeatedly been applied to dormant trees as strong as eight times the normal dosage with no injurious effects whatever.

There is no doubt whatever but that with HCN gas is the most effective means of treating the San José Scale, and in some instances would be made quite practical, as in the case of a few small or especially valuable trees. Nevertheless, it is not practical for the average orchardist, and could not, or would not be used by any small farmer or orchard owner.

The fact that fumigation is not practical to the average fruit-grower (and the average grower is the one person that should be reached in all cases), makes spraying, by elimination of other methods, the only practical means that can be employed generally at present in combating this insect. If fumigation were as simple and inexpensive as spraying, and yet as much more effective as it is, probably not one person in five would be induced to fumigate for San José Scale. The reason for this is that during the last decade the public has been educated to spray. There are few farmers or small fruit growers who do not know at least something about spraying, and although this knowledge is, as a rule, of little use in spraying for San José Scale in comparison with other insects, yet it makes it easier for these persons to adapt themselves to more difficult and effective work.

The professional orchardist does not, I think, realize the magnitude of the task when we speak of educating the public to spray for the Scale. Such persons have been spraying for years. They would not think of continuing their business without spraying, and do not realize that they are simply about 1 per cent. of all the persons in the State who are trying to raise fruit, and the other 99 per cent. have as yet not attempted to fight the Scale in any practical way. It may be true that this small number of growers

raise the larger part of the marketable fruit in the State, yet the fact that they have been successful as specialists does not entitle them to more consideration than belongs to the large number of small and unsuccessful growers. Outside of about a dozen counties practically nothing was known of spraying for San José Scale before the Division of Zoology commenced its demonstration last fall.

Bearing the above facts in mind it was decided that the best method of educating the public was to send out men who were competent to do the work in a satisfactory manner and to teach others how to do so. These men were to be equipped with apparatus sufficiently powerful to show how it should be done, and were actually to make and apply the materials recommended for spraying for San José Scale, and to give such other information regarding the entire work of fighting the Scale and other injurious insects as might be found necessary.

The apparatus carried by the Demonstrators must have two requisites: It must be powerful enough to do satisfactory work, yet it must not be too expensive to come within the reach of the average small fruit grower, nor too heavy to be easily conveyed from place to place. The kind of apparatus must be adaptable to the needs of small growers, as the large grower who wishes expensive apparatus has interests enough involved to cause him to go, of his own initiative, to places where he can get the information or instruction he desires. This is just what the small grower cannot do, and such help must be taken to him.

The Lime-sulphur-salt Wash was used in this spraying, for the reason that at present this mixture has met with the approval of the best scientists and has been the most successful of all materials with the majority of practical men. Besides it is the simplest to make and the cheapest of the home-made preparations. The objections to it are the trouble in preparing small lots and its caustic action on the exposed parts of the persons applying it. None of the present commercial preparation could be conscientiously used for the simple reason that no such preparation has as yet proven successful enough, nor has any such material been used for a sufficient length of time to justify the recommendation of it at this time. It is to be remembered that this is practical work and not an experimental proposition.

This work during the past fall has been necessarily to some extent preliminary. The State was divided into twenty sections of from one to five counties in each, according to the relative values of interest involved. A man was sent into each district on November 1st with instructions to spend at least two weeks in finding out where San José Scale was most abundant, for at that time there was reason to believe that there were wide areas in the Central and Northern sections of the State where it had not yet appeared. If the Scale could be checked at the boundaries of these uninfested areas, it was reasonable to suppose that such localities could be kept clean for probably many years to come.

Where they found Scale and where demonstrations of spraying were desired and conditions favorable they were to make arrangements and to schedule such appointments for a later date. All

persons making application through the central office were requested to send with their applications twigs thought to be infested, since many persons are unable to distinguish San José Scale from several other scale insects, prominent among which are Scurfy and Oyster-shell. Demonstrations were scheduled only at places found to be favorably situated, centrally located, and five miles or more from any other demonstration to be given. As soon as a schedule of meetings was arranged by the agent, some time in advance, they were advertised in the local papers and by circulars or posters placed in conspicuous places.

On the day fixed for one of these demonstrations, the agent prepared one kettle of the material used, which in all cases for San José Scale was the boiled Lime-sulphur-salt Mixture, and applied this to trees where spraying has been arranged previously. The apparatus used was the ordinary barrel pump with corresponding equipment. The material was boiled in most cases in an ordinary iron farm kettle, holding about 25 gallons. Fifteen or twenty gallons of water was used, and this diluted, after boiling the mixture to fifty gallons or a proportionate amount, with either hot or cold water. The boiling continued for at least one hour, a brick-red color being sought, when the lime used was calcium carbonate, and dark olive green was obtained with longer boiling when using magnesium carbonate. In all cases the Vermorel nozzle and an extension rod were used.

Meetings of this kind were held in thirty counties,—182 in all, with a total attendance of over 5,000. Practically every one of these were interested, practical persons, and assuming that only one out of ten, which is a very low estimate, will spray during the coming season, it means that 500 persons, widely separated in this State, will undertake spraying, who would not have done so but for this instruction. This will not be the end of this work, for it also means that if only one small grower take up the work, in the course of a year or two the majority of his neighbors will be doing it also when they see his profits. This has been the case in certain counties of Southern Pennsylvania, where a few public-spirited and progressive horticulturists began such spraying a few years ago, and where at the present time the properties of these very persons have formed the center around which the most progressive work in the State is being done.

Up to this time at least two important facts have been brought out: From the personal inspection made by these agents it can not now be definitely said that there is a single county in this State where there is no San José Scale. From several it has not been reported, but the inspection in those counties has not been general enough to give definite results. It is present in every fruit-growing section of any considerable importance. Not only this, but it is also generally distributed over local areas, and if it be not general or on all of the trees in such areas, it is on a few at separated intervals, showing that it is just getting a good start, and the worst is yet to come unless active means to fight it are immediately taken.

The work was actively continued until the first of the present year, when it was dropped on account of the unfavorable weather,

but it will be resumed this spring at the first opportunity. It will be conducted in about the same manner as last fall, although plans have been made to have it more systematized than formerly. The work of the past season was the first and successful trial of a method originated by Prof. H. A. Surface, Pa. State Zoologist, and never before tried anywhere. It was necessarily somewhat imperfect in the beginning and there were times when the theoretical and practical did not connect owing to unforeseen difficulties of many kinds, but all of these were overcome in due time. An endeavor will be made to prepare early schedules for the demonstrations of the coming spring, from the many applications already received, so that when actual work is started it may continue uninterruptedly. It is hoped that by May 1st every county in this State in which there is San José Scale will have been reached by one or more demonstrations, and before the present appropriation is exhausted it is believed that a representative of the Division of Zoology will be able to give a demonstration in each infested township.

It is certain, from the many favorable reports received and now on file in the office of the State Zoologist, that the public fully appreciates the value of this very important work, and all interested persons appear anxious to avail themselves of the needed assistance thus offered them by the State.

TESTS OF COMMERCIAL INSECTICIDES.

By T. C. LeFEVRE, Field Assistant to Prof. Surface.

In testing an insecticide, commercial or noncommercial, it is necessary to consider it from at least three points of view, viz.:

(1) Does it kill a sufficient number of the insects for which it is applied to warrant its use?

(2) Does it injure the tree or plant to which it is applied?

(3) Is the cost so great as to render it too expensive for practical use?

In considering the efficiency of an insecticide we frequently find mistakes which greatly alter the final results and conclusions.

Among these mistakes it might be well to mention that many users of insecticides fail to consider the scales which are already dead at the time of spraying. On close examination in the early winter or late fall, we found on peach and plum trees, moderately infested, from 10 to 20 per cent. of the scale dead, and on apple and pear from 5 per cent. to 10 per cent. dead. It is our opinion that the number of San José Scale killed by agencies other than insecticides, at the end of an ordinary winter, may reach from 50 to 75 per cent. of all these pests on the tree. This being the case, it can easily be seen what a great difference this would make in our final conclusions, based only upon the percentage found dead when inspecting after spraying. It was our plan to calculate accurately the percent-

age of scale insects killed by each insecticide. To do this we found the percentage dead previous to spraying on one tree of every lot treated with each insecticide. By taking the differences of percentages before and after the treatment it would seem to give the desired accurate results. Although in theory this method should be a proper means of calculating the percentage of dead scale insects. it will not work out in practice.

After second thought, the obvious impossibility of making any accurate percentage of either dead or living scales within one or two per cent. will be seen. At the best, such a calculation is only an approximation. We must bear in mind that no two untreated trees, nor any two untreated branches of the same tree are likely to have the same percentage of dead or living scales, and the same may be said of any two parts of any one branch. We have frequently examined trees on one branch of which not over 50 per cent. dead scales could be found, on an average, while on another over 50 per cent. were found. In the same way, we have often examined sprayed twigs on which there were spots of several square inches area with not over 1 per cent. of the scales dead, while within 6 inches, 90 per cent. were dead. These facts should enter into the final calculations of percentages of living and dead scales on treated trees, and the probability of not reaching an accurate figure is so large that it may be regarded as an impossibility. For this reason we do not think it possible that an estimation can be made which is within 5 per cent. on either side of the accurate figure, and any estimation carried out to the fractional part of one per cent. it little else than an absurdity.

A third serious mistake is where trees are not thoroughly sprayed. In this case the insecticide is not given a fair chance, as where parts of trees are missed breeding centers are established for the next season. From these centers the entire tree may soon become entirely re-infested, with the result that the insecticide is marked as "worthless," yet it may have killed every scale that it touched.

Another mistake, although not so common as the others, is where trees are sprayed for an insect with which it is not infested, for it must be understood that no spraying should be done merely for the sake of "spraying," especially with an insecticide which has an oil for its base, as the oil is bound to injure and can do no possible good where the tree is not infested, and consequently will be a waste of material and labor as well as injury to trees.

As to the effect on the tree, it is absolutely necessary to note the condition of the tree previous to treatment. Here again the insecticide is often blamed for something which it does not do, as many times the trees are nearly dead before they are sprayed, and may be so far gone that even the most efficient spraying could not save them, any more than a physician can save a dying man.

In the item of cost is where we find our first great objection to Commercial Insecticides, as when applied in a strength sufficiently strong to be effective we find that the cost is too great for the use of many fruit growers. The second objection to them is their general inefficiency.

Commercial Insecticides on the market at the present time may be roughly grouped in the following classes:

(1) Those having crude oils for a basis, which are rendered soluble by some "secret" means, as "Scalecide," "Target Brand Scale Destroyer," etc.

(2) Modification of the Lime-sulphur-salt Solution, as "Con Sol," and "Horicum."

(3) Partial union of 1 and 2, as "Kill-O-Scale," and "Salimene."

(4) By-products of no other use, and for that reason often recommended by the originators as the "only insecticide and fungicide in the world." Some of the last-named compounds have proven to be such as Calcium Sulphate, one of the most insoluble compounds known to chemistry, a paint mixture, which would not kill even the Aphids, and many others too numerous to mention, but all of about the same value as the two just mentioned above.

Early in July Professor Surface outlined and the writer undertook a series of experiments to determine the possibility of spraying during the summer months and hold the scale in check to such an extent as to warrant summer spraying. In these experiments commercial insecticides were mostly used, and the results are summarized below:

In cases where "Con Sol," "Target Brand Scale Emulsion," and "Kil-O-Scale" were applied in summer strength as recommended by the manufacturers, we found that they caused the crawling larvæ to become fixed and secrete coverings much sooner than when the trees were not treated. When applied strong enough to kill the adult scale the foliage was badly burned, and in some cases the trees were killed.

From these experiments we found to make Summer Spraying successful in the slightest degree we had to spray at least once a week during the entire breeding season. Our best results were obtained by using Whale Oil Soap, 1 pound in 5 gallons of water, which killed a large number of the crawling young, and no harm could be noticed to the tree on which it was applied.

To determine the real value of some of the most widely advertised commercial insecticides, a series of experiments was started early last autumn, and this has been continued up to the present time. Although it is impossible to give the final results of these experiments at present, yet we can now give the results of the trees sprayed prior to December 20, 1905, working on the basis that an insecticide exerts all its influence within a month from the time of application.

Thirty trees, consisting of apple, peach, pear and cherry were sprayed December 6, 1905, with "Horicum," which is a prepared form of the Lime-sulphur-salt Mixture, made and sold by the Hammond Slug Shot Works, at fifty cents per gallon when purchased in 50-gal. lots. This was applied in proportion of one part to twenty-five parts of water. One application was made with a result that from fifty-five to sixty-five per cent. of the San José Scale were dead on January 25.

"Target Brand Scale Destroyer," made by the Horticultural Distributing Company, was applied in proportion of one part to twenty-five parts of water on one hundred trees, consisting of apple, plum and a few peach. The result here was very poor, as with the preceding, as not more than fifty or sixty per cent. of the insects were

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killed. The results were about the same on all varieties of trees. The material was applied December 6th, and the last examination was January 5.

"Target Brand Resin Emulsion," made by the same firm as the above, was sprayed on a few trees but owing to a tendency to gum both pump and nozzle it was very difficult to apply. On both the peach and plum trees the results were far from satisfactory. This was applied October 10, and the last examination on January 10 showed not more than fifty per cent. dead. The young larvæ continued to fix and secrete a coating for some weeks after this material was applied thoroughly to the trees infested with them.

"Kill-O-Scale," made by the Thomsen Chemical Company, was applied Dec. 8th, one part to twenty parts of water, on about fifty plum and pear trees moderately infested. The results here varied considerably, but the average showed not more than fifty to sixty per cent. of the scale dead on Jan. 5th. A second application on the same varieties of trees December 19 gave the same results. These results together with the high price of the insecticide ($1.00 per gallon when purchased in large quantities) would certainly condemn its use in comparison with the more successful and cheaper remedies, such as Lime-sulphur Wash or Whale Oil Soap.

Warren's "O. K.," made and sold by S. R. Warren, was applied one part to twenty of water on twenty-five apple and plum trees, Dec. 8. On these particular plum trees the examination on Jan. 6 showed from ninety to ninety-seven per cent. of the insects dead, while on the apple trees only forty to fifty per cent. were dead. These results may be due to other conditions than the insecticide, but from the count it appears that this material was nearly successful on one kind of tree, and a complete failure on another, although applied on the same day and under the same conditions.

Oct. 5 we sprayed twenty-five apple trees with "Scalecide," made by the J. G. Pratt Co., using one part to twenty-five of water. Examination made two weeks afterward showed that at least ninety per cent. of the scale were dead. On Oct. 10th a block of plum trees were sprayed with the same material and strength, using the same apparatus, and on this lot not over forty per cent. of the scale were dead on Nov. 20. With these varying results it was though necessary to spray more trees for comparison. On Dec. 6 twenty-five apple and plum trees were treated with the same material at the same strength. An examination on Jan. 5 showed from thirty-five to forty-five per cent. of the scale dead, the result upon apple and plum being the same. Further experiments will be made with these materials, particularly with the last two in order to see if the differences are not due to natural conditions of the insects on the different trees rather than to results of spraying. It must be remembered that from fifteen to forty per cent. of the scale insects may be found dead during the winter, even upon trees that have not been sprayed, and consequently the total percentage of dead individuals given above cannot be attributed to insecticides.

From these experiments we are forced to conclude: (1) That no hard and fast rule can be formed as to the success or failure of any commercial insecticide, as we have had a few fairly successful re-

sults and complete failures under the same conditions. It is necessary to repeat them several times in order to eliminate the chances of error.

(2) In the majority of cases the failures or partial failures far outnumber the results that would be called even fairly successful.

(3) It is impossible, owing to varying original conditions and final results to calculate accurately the per cent. of scale insects killed, and the margin of variation may be at least five per cent. on either side of the definite result.

(4) That the solution of the problem of controlling the San José Scale by means of commercial insecticides is yet to be solved.

EXPERIMENTS WITH STANDARD HOMEMADE INSECTICIDES FOR THE SAN JOSE SCALE.

By ROSS F. LEE.

Owing to the great increase of the San José Scale and other scale insects throughout the State, the Division of Zoology of Pennsylvania, decided to start a series of experiments with Lime-sulphur salt Mixtures and other home-made remedies. There is a great demand for a remedy which is cheap, efficient, and easy of application, yet not injurious to trees. I am afraid too many of us consider our time wasted which we spend working among our fruit trees. The Scale is simply a reminder and an awakener to the fact that in the past our fruit trees suffered for want of care and attention. A series of experiments were recently undertaken to determine, if possible, the cause of some failures with the Lime-sulphur-salt washes, and their variations, in controlling the San José as well as other scale insects. Other remedies, such as Kerosene and its variations, Whale Oil Soap, Warren "Sand Oil" and Caustic Soda were also used.

The failure of an insecticide may be caused in many instances by the mode of application, improper preparation of materials, poor classes of crude material, and inferior apparatus, rather than by the material actually used in spraying. This is especially true in the case of the Lime-sulphur-salt wash. In preparing this material the several processes to be carried out have a tendency, at the best to invite carelessness, although under such a condition this can be more safely used, with success, than can any other insecticide. Care should be taken to select a good grade of fresh stone lime in order to get the best chemical combination possible.

The following are the results of using the Lime-sulphur-salt wash and its variations,—a wide degree of effectiveness being noticeable.

1. Lime-sulphur-salt, self-heated but not boiled with fire, and used in the proportion of 22 lbs. Lime, 17 lbs. Sulphur, and 6lbs. Salt to 50 gals. water, was applied to 50 peach trees. The application was made on Nov. 15th, and an examination in early January showed

45 per cent. of the Scale dead. Another application of the same material on pear and plum on November 2nd showed 65 per cent. of dead scale in January.

2. Lime-sulphur-salt (Formula, 22 lime, 17 sulphur, 10 salt, 50 gallons water), boiled for one-half hour, sprayed on moderately infested trees, Nov. 23rd, showed 73 per cent. dead scale on the last examination, on Jan. 11th.

3. The same materials boiled three-fourths hour and applied to badly encrusted apple, plum and pear, on Nov. 2nd, showed eighty per cent. of dead scale in January.

4. On boiling Lime-sulphur-salt one hour in the former proportions and spraying on peach trees, 96 per cent. of the scale insects were found dead. This variation from No. 2 of 23 per cent. in the number of dead scale should show the importance of boiling for at least one hour.

5. At the side of these trees, Lime, Sulphur and Caustic Soda (not boiled) (22, 17, 6), was used on the same varieties of trees, and at the same time,—only 65 per cent. of the Scale being dead on examination at the same date.

6. Lime and Sulphur (22, 17, 50), applied on badly encrusted peach trees on November 18th, showed 75 per cent. dead scale insects on Jan. 11th.

7. Lime-Sulphur-Concentrated-Lye (22, 17, 2½ lbs.), boiled one hour, showed 85 per cent. dead Jan. 11th.

8. Lime-Sulphur-Caustic-Soda (22, 17, 6 lbs. in 50 gal. water), boiled one hour, gave 80 per cent. dead at the same time.

9. During the latter part of July, apple, peach and plum trees were treated with Lime and Sulphur, (25, 20 lbs. and 60 gallons water).

10. Another lot, of the same varieties and standing beside the former block, were sprayed with Lime-sulphur-salt (25, 20, 12 lbs., 75 gal. water), at the same time. Both lots were boiled 45 minutes, and both were equally badly infested.

A month later only about half the scales were dead, the majority of the dead ones being on the trunks and larger branches, but the tips of the twigs, being protected by the leaves, were yet badly infested. The young and recently fixed scales, however, were practically all dead.

11. Both lots were again sprayed during the latter part of August with Lime-sulphur-salt (25, 20, 12, 75), boiled three-fourths of an hour, and at the last examination, on Jan. 10th, 85 per cent. were dead. Many of the trees, especially apple and peach, were severely injured by this latter spraying, the leaves and young twigs being in many instances entirely killed. Although it is probable that the continued ravages of the scale would also have injured some of the trees severely if continued uninterruptedly until late fall. One fact was brought out in this work, which is true in all summer spraying, and that is the difficulty of doing thorough work while the leaves are on the trees, as it is practically impossible to reach the small twigs with enough material to effectively reduce or kill the scales.

Success with the Lime-sulphur-salt wash depends more upon thorough work than in case of other insecticides. A pump with a high pressure and a good nozzle, producing a fine spray, are neces-

sary to reach the small twigs. It is not as penetrating or searching as the oils, making it necessary in some instances to go over the trees two or three times to reach every spot not covered by the first application. This wash is now well proven to be a fungicide as well as an insecticide, and when applied leaves a white coating on the bark, which aids the operator in finding the missed places. It has been found to be the cheapest and most effective wash known, being absolutely safe in the hands of the amateur. It will not injure the most tender fruit trees when applied during the dormant season, but on the contrary aids in ridding the bark of fungus diseases, which most commercial insecticides will not do.

Lime-sulphur-Caustic -Soda being the self-boiled wash, killed about 10 per cent. less scale insects, in almost every experiment in which it was used, than did the boiled Lime-sulphur-salt wash. There was always more sediment left behind in the self-boiled wash, which tended to clog up the nozzle and render the mixture difficult to spray. It is just as disagreeable to handle as the boiled Lime- sulphur-salt wash, and is not as efficient in keeping down the scale. It is therefore not recommended.

KEROSENE.

Kerosene mixtures used on apple, plum, pear and peach were sprayed on Sept. 21st with some very good results, while others were very poor, as is usually the case when using the oils. These trees were moderately infested with San José Scale on the plum and peach, while most of the pear and apple were also infested with Scurfy Scale.

12. Kerosene and Lime (Limoid), 20 per cent. Kerosene, showed 55 per cent. of the scale dead on Jan. 11th.

13. The same material applied to apple at the same time and strength, showed 70 per cent. of the scale dead.

14. Moderately infested apple, plum, pear and peach sprayed with Kerosene Emulsion (20 per cent. Kerosene), have 95 per cent. of all scales dead at the 1st of the present month. Th wide difference in results in using the oils is probably due to the fact that Kerosene tends to separate from preparations with water. These mixtures being applied to the Scurfy Scale on pear and apple did not seem to affecct it in the least, the eggs being apparently healthy.

15. Kerosene Mixture used on plum, apple and pear, moderately infested with San José Scale, was sprayed on Sept. 22nd, and examined on Jan. 11th, with the result that 90 per cent. of the scale were found dead. (20 per cent. of kerosene.)

16. Warren's "Sand Oil" or Crude Petroleum, used as it came from the barrel, was applied on pear and apple encrusted with San José Scale on Nov. 17th and examined on Jan. 10th. All San José Scales were found dead, but the eggs of the Scurfy were not affected, or at least had the appearance of being uninjured.

17. Experiments with Whale Oil Soap two pounds to one gallon of water on pear and plum, killed 55 per cent. of the scale. This application was made on Nov. 1st, and last examined on Jan. 11th.

18. Caustic Soda, applied November 2nd, at the rate of (a) 7 and (b) 10 pounds to 50 gallons of water showed only 30 per cent. of dead scale. Both strengths burned the foliage of the trees, but at

present we cannot tell if there was any further injury. Examination was made, as before, during the first week in January.

In conclusion I would sum up the results as follows:

(1) Caustic Soda is practically worthless as an insecticide for San José Scale.

(2) Whale Oil Soap gave very poor results, even when applied at the strength of two pounds to a gallon of water.

(3) A cheap grade of crude oil killed all the scales, but the trees were materially injured, the extent of which cannot be learned until a later date.

(4) Kerosene and its variations gave very good results in some instances, but very poor results in others. This is probably due to the fact that it is hard to keep the oil from separating from the water with which it is mixed. This same fact accounts for the injury to the trees. Besides these oils being dangerous, they are almost too expensive to be used by the average fruit grower.

(5) The Lime-sulphur-salt washes and variations have proven the most efficient in holding the scale in check. The "self-boiled" washes, where Caustic soda was used, destroyed about 10 per cent. less scale, in every instance, than did the boiled Lime-sulphur washes.

This material has proven the statement made by other experimentors, that IT IS THE STANDARD APPLICATION, being the most efficient, cheapest, most beneficial on the trees and BEST ALL AROUND REMEDY at present used in controlling this pest. It is capable of being put in the hands of the careless as well as the careful man, and if the former have no good results, he is at least sure of no injury resulting to his trees. Success with this, as with all other insecticides depends more upon proper work and preparation than upon the merit of the material itself.

THE FOLLOWING IS A CONCISE TABULATION OF THE STATEMENTS MADE ABOVE.

Number.	Material.	Amount.	Time boiled.	Trees.	Number.	Date sprayed.	Date expired.	Per cent. dead.
1	Lime,	22 lbs.						
	Sulphur,	17 lbs.						
	Salt,	6 lbs.						
	Water,	50 gals.,	Not boiled,	Peach,	50	Nov. 15,	Jan. 8,	45
2	Lime,	22 lbs.						
	Sulphur,	17 lbs.						
	Salt,	10 lbs.						
	Water,	50 gals.,	½ hr.,	Peach,	50	Nov. 23,	Jan. 11,	73
3	Same as above,	Same as above,	¾ hr.,	Apple,	80	Nov. 2,	Jan. 14,	80
				Plum,	80			
				Pear,	48			
4	Lime,	22 lbs.,	1 hr.,	Peach,	25	Nov. 10,	Jan. 11,	96
	Sulphur,	17 lbs.						
	Salt,	10 lbs.						
	Water,	50 gals.						
5	Lime,	22 lbs.,		Apple,	20			
	Sulphur,	17 lbs.,		Pear,	40			
	C. Soda,	6 lbs.,	Not boiled,	Plum,	40	Nov. 2,	Jan. 10,	65
6	Lime,	22 lbs.,	1 hr.,	Peach,	25	Nov. 18,	Jan. 11,	75
	Sulphur,	17 lbs.,						
	Water,	50 gals.,						
7	Lime,	22 lbs.						
	Sulphur,	17 lbs.						
	Con. Lye,	2½ lbs.						
	Water,	50 gals.,	1 hr.,	Peach,	25	Nov. 11,	Jan. 10,	85
8	Lime,	22 lbs.,		Peach,	50			
	Sulphur,	17 lbs.,		Pear,	6			
	C. Soda,	6 lbs.,		Cherry,	2	Nov. 12,	Jan. 10,	80
	Water,	50 gals.,	1 hr.,					
9	Lime,	25 lbs.,		Apple,	10			
	Sulphur,	20 lbs.,		Peach,	25			
	Water,	60 gals.,	45 min.,	Plum,	25	July 25,	Aug. 25,	50

TABULATED STATEMENT—Continued.

Number.	Material.	Amount.	Time boiled.	Trees.	Number.	Date sprayed.	Date expired.	Per cent. dead.
10	Lime,	25 lbs.,		Apple,	10			
	Sulphur,	20 lbs.,		Peach,	25			
	Salt,	12 lbs.,		Plum,	25	July 25,	Aug. 25,	50
	Water,	75 gals.,	45 min.,					
11	Lime,	25 lbs.,		Apple,	10			
	Sulphur,	20 lbs.,		Peach,	25			
	Salt,	12 lbs.,		Plum,	25	Aug. 28,	Jan. 10,	85
	Water,	75 gals.,	¾ hr.					
12	Kerosene,	1 gal.,		Plum.				
	Lime,	5 lbs.,	Mixed,	Peach.				
	Water,	4 gals.,		Pear,		Sept. 21,	Jan. 11,	55
13	Same as 12,	Same as 12,	Mixed,	Apple,		Sept. 21,	Jan. 11,	70
14	Kerosene,	2 gals,		Apple.				
	Soap,	½ lb.,	Emulsion,	Peach.				
	Water,	2 gals.,		Pear.				
	Emulsion,	1 gal.,	20 per cent. oil,	Plum,		Sept. 22,	Jan. 11,	95
	Water,	4 gals.,		Apple.				
15	Kerosene,	20 per cent.,		Pear.				
	Water.		Mixed,	Plum,		Sept. 22,	Jan. 11,	90
16	Crude,	Pure,	Pure,	Apple,	2			
	Petroleum,			Pear,	10	Nov. 17,	Jan. 20,	100
17	Whale Oil Soap,	2 lbs.		Pear.				
	Water,	1 gal.,	Mixed,	Plum,		Nov. 1,	Jan. 11,	55
18a.	C. Soda,	7 lbs.		Peach,		Nov. 2,	Jan. 3,	30
	Water,	50 gals.,	Dissolved,	Plum.				
				Pear.				
18b.	C. Soda,	10 lbs.		Peach,		Nov. 2,	Jan. 3,	30
	Water,	50 gals.,	Dissolved,	Plum.				
				Pear.				

NOTE.—The experiments outlined above were planned by the State Zoologist, and most of the field work was done by Mr. Lee. The results have been inspected by other members of the force of employees, and a final report will be published after the final inspection next August, when the entire effects on trees, fruit and scale insects can be determined fully.—H. A. S.

FUNGUS DISEASES OF ORCHARD TREES AND FRUITS.

By M. B. WAITE, Pathologist in Charge of Orchard Diseases, United States Department of Agriculture.

SPRAYING MIXTURES.

It will not be possible for me to explain the method of preparation of all the spraying mixtures that have been used in the treatment of all the diseases which affect our fruit trees. I will therefore take up two of the leading mixtures used in the orchard and a few of the fungus and other diseases.

There are two preparations that stand our prominently as by far the best of all that are used in treating the orchard. The lime-sulphur-salt mixture is the best for spraying the trees while they are dormant, up to the time the buds have begun to swell in the spring. The Bordeaux mixture, especially if combined with an arsenite, is the best for spraying the trees when they are in foliage and fruit.

THE LIME-SULPHUR-SALT MIXTURE.

The formula varies for this considerably as used by different people in different sections. The mixture is so good that almost any combination of sulphur and lime properly boiled together, usually answers the purpose for which it is intended. We have adopted as our standard formula, however, 15 pounds of flour or flowers of sulphur, 20 pounds of high grade stone lime, 10 pounds of salt, to 50 gallons of water. The sulphur should be mixed with a little water in the form of a paste. About 10 gallons of water should be brought to a boil, or nearly so, the lime added and then the sulphur and salt all practically together. If the lime is not pure high grade stone lime the amount should be increased so as to give the equivalent of pure lime. We have used partially air slaked lime with success, provided we increased the quantity. The mixture can be boiled in an iron kettle or better, by means of steam conducted through a pipe into a barrel or cask. While boiling the rest of the water should be added. This spray should be applied warm and mixed up immediately before using. It is effective against the curl leaf of the peach and against most of the apple cankers and bark diseases of fruit trees. It kills the spores of pear leaf blight, apple scab, the Monilia fungus and other things of that sort and retards the first appearance of these diseases but does not prevent summer attacks of them on the new growth. Furthermore it is the best known remedy against the San José Scale and certain other insect pests, so that it combines to a remarkable degree the fungicidal and insecticidal effect. It can not be used after the leaves are out, except possibly as a wash to apply directly to the trunks, as it injures foliage.

BORDEAUX MIXTURE.

The best all around fungicide for use on fruit trees is the Bordeaux mixture. There are various formulæ for making up this mixture and various methods of mixing. I can give only the essential points.

The old standard formulæ for Bordeaux mixture is the 6-4-50 formula, that is using a 50-gallon barrel as the standard, 6 pounds of blue stone (copper sulphate) 4 pounds of lime to 50 gallons of water. Where the lime is of good grade and where the plants are not easily injured, as with Irish potatoes, cantaloupes and grapes, this formula is probably the best that can be used. However, on apples and pears while they are ordinarily uninjured by Bordeaux, there has been a great deal of trouble with russeting. This russeting is probably compensated by an increased quantity of lime and by diluting the preparation.

Furthermore, so much of the lime is bad that it is really safer to use a larger quantity than the standard formula calls for. The 5-5-50 formula is therefore a little safer than the 6-4-50 and has come to be regarded as a standard for apple spraying. For pear-blight, apple leaf blight, and for the smut on the apple fruit and the rust on the pears, the 4-4-50 answers very well. In other words, the formula is slightly diluted.

Where the lime is at all questionable its amount should be increased to make up for the deficiency in strength. On this account many growers are using the 4-6-50 formula.

On peaches and Japanese plums Bordeaux mixture during rainy seasons injures the foliage, producing not only the "shot hole" effect, but frequently defoliating the trees, even before the fruit has matured. It is risky to spray peach trees or Japanese plums, in foliage, with any formula of copper or in fact with any fungicide which we have yet been able to find, but if they must be sprayed and the orchardist is willing to take the risk, a Bordeaux containing a large excess of lime should be used. We regard the 3-9-50 formula as the best formula for peaches.

APPLE SCAB.

This fungus disease is one of the most serious apple troubles in Pennsylvania. A similar disease occurs in the pear, caused by a closely related fungus and is controlled by the same treatment. They may therefore be discussed together.

The scab fungus is especially susceptible to weather conditions. Moist, rainy or muggy weather during the spring months greatly favors the disease, while dry, sunny weather retards its progress. The scab fungus germinates in drops of rain or dew. The spores are able to germinate and enter the tree only during certain favorable spells of weather. We term these periods of moist weather infection periods, and it is a good thing for the fruit grower to recognize such spells of weather as periods of infection when the scab and other fungi are able to germinate and enter the fruits. It is necessary to have the fruits and foliage protected by the spray before these infection periods. As a result, apple and pear scab are both rather difficult diseases to control during a moist season. Spraying must begin very early. The first treatment should be when the fruit trees are in bud, when the cluster buds have opened out, but before the blossoms have opened. Usually by beginning on the earlier blooming varieties and having everything ready to strike promptly, the orchard can be sprayed when in bud before the blossoms open.

The second treatment should be made just as the last blossoms are falling. Here again there may be a difference of two or three

days in the time the different varieties can be treated. In the second application it is advisable to add the arsenate of lead or Paris Green to the Bordeaux Mixture and destroy the codling moth as well as the apple scab fungus.

The third treatment should be made seven to ten days later. If the season is dry, from this on additional treatments may not be necessary. However, if the season is moist, two or three additional sprayings at intervals of two weeks may prevent later infections and be of value in saving the crop. The later treatments for apple scab are made when the tree is in full foliage and will be effective in preventing the leaf blight of apples. There are two or three leaf blights caused by different fungi, but they are easily preventable by spraying after the trees are in full leaf.

BITTER ROT OF APPLE.

Until the past season this fugus disease has been one of the troublesome problems in orchard pathology. No one had been able to control the disease with even reasonable satisfaction. The disease is particularly abundant through Maryland, Virginia and west to Missouri, through the southern portion of the commercial apple districts of this country. So far as known it rarely destroys fruit in quantity in this State but as it does occur and may some time be injurious, you will be interested in the recent successful results.

It has been extremely destructive in the Yellow Newtown apple districts of Albermarle and adjacent counties of Virginia. In recent years it has been destroying almost the entire crop of many sections. During the past season Mr. W. M. Scott, Orchard Pathologist in the Bureau of Plant Industry, carried on a successful series of spraying experiments which showed exactly how to treat the disease and which saved in some cases as high as 98 per cent. of the crop, although on the control trees left unsprayed less than half a dozen sound apples could be found, the entire crop was ruined with this fungus rot. As the result of this extensive series of experiments, Mr. Scott outlines the treatment for Bitter Rot as follows:

Spray with 5-5-50 Bordeaux mixture, beginning June 10th to 15th, five to seven times at intervals of two weeks.

The results of his experiments showed that much of the spraying previously had been attempted too early in the season, that in order to secure good results it is necessary to begin about the middle of June and keep the fruit thoroughly coated with the Bordeaux Mixture throughout the summer. After the fruit becomes thoroughly coated by three or four sprayings, the mixture stays on pretty well until picking time.

APPLE CANKER.

We have had a good deal of complaint from Pennsylvania as well as other sections of the country about fungus diseases on the bark of apple trees. There are some half dozen different species of fungi which produce apple canker. Sometimes these apple canker spots resemble pear blight, and conversely the pear blight disease itself produces dead patches on the limbs and trunks of apple trees resembling canker work. Apple canker, as suggested above, is largely checked by dormant spraying with lime-sulphur-salt. It is also controlled, at least partially, by the Bordeaux Mixture spraying. How-

ever, where there are old cankers, it is desirable to prune out as much as possible of this trouble where it is on smaller limbs and to gouge out the dead spots, soak them thoroughly with some fungicide like corrosive sublimate or sulphate of iron and dilute sulphuric acid and then paint the wound with white lead paint.

PEAR LEAF BLIGHT AND FRUIT SPOT.

This is one of the commonest diseases of pears and it occurs on quinces as well. It not only spots up the fruit, making it unsightly and partially or wholly unmarketable, but it defoliates the trees, cutting down their vegetative vigor and productiveness. Trees affected for three or four years with pear leaf blight soon get in a stagnant condition. They bloom profusely, in fact they are snowy white with blossoms, but they set little fruit. The remedy for trees in this stagnant conditions is to prune them back pretty severely, removing two-thirds of the bearing wood and fruit spurs and then spray them after the foliage has formed, with Bordeaux Mixture.

This disease is so easy to prevent that in my own orchard I use 4-4-50 formula of Bordeaux for this purpose. About two or three treatments are ample for this disease. The first treatment should be made between May 15 and June 1, when the trees have come into full leaf and when the young pears are three-fourths of an inch in diameter. Of late years the Keifer and the Le Conte pears have been attacked seriously by this disease, although ten years ago it occurred very slightly on these varieties.

PEACH AND PLUM ROT.

It may be well to call your attention to some of the diseases which are not so easily controllable. The brown rot of peaches and plums is a very disastrous disease. It occurs from the Great Lakes region, the northern limit of peach culture, to the Gulf, and with increasing severity as one goes southward or toward the ocean. It is less serious in the mountains than it lower altitudes. So far we have been unable to control this disease satisfactorily by spraying. Bordeaux mixture will reduce its ravages to some extent, frequently there being 50 per cent. less rot on sprayed trees, but this is not regarded as satisfactory.

The dormant spraying with either Lime-sulphur-salt or with Bordeaux also produces some good effects, but I have seen the rot occur very badly on trees thoroughly sprayed for two consecutive seasons with Lime-sulphur-salt wash, so that it does not prevent the trouble.

We have carried on elaborate experiments with this disease and are working hard upon it, but so far we have not mastered it.

APPLE ROOT ROT.

Here is another fungus disease that has baffled all attemps at a remedy. In fact it is a very unpromising, almost hopeless type of trouble. We have no treatment that we can apply to the roots in the way of fungicides or germicides and so far the apple root rot has remained strictly unconquered. When all the other troubles are straightened out perhaps we may be able to get some hold on this difficult problem.

PEAR BLIGHT.

This disease, which is caused by a bacterial germ, occurs on the pear, apple, quince, and other plants of the Pome family. It has been one of the stumbling blocks in orchard diseases for years, but during the last few years through the careful working out of the life history of the bacillus which produces it, we are now able to control this trouble. It is only a question of careful thorough work. This disease is transmitted by insects on the blossoms, not only the common honey bee, but flies, wasps and other insects carry it from flower to flower and from orchard to orchard. It is also occasionally carried long distances by birds. This disease is infected mainly through the blossoms, but it is also infected to a large extent through the tender tips of growing twigs and occasionally through the fleshy bark of twigs and branches. Most of the germs die out in the tree shortly after they are produced, but occasionally the disease is able to continue in the tree until autumn. Along the advancing margin of the trees the germs keep alive and if they can keep on multiplying until the tree goes into a dormant condition in the winter, they are able to live through the winter and begin to grow again the next spring. When root pressure gorges the tree with sap in the spring this causes the blight to start off with renewed vigor. A gummy substance exudes unto the bark under certain weather conditions and this gummy exudate is the virus of the disease, is carrier onto the opening blossoms and thus the disease spreads. These hold over cases become the new infection centres each spring. The blight has no other means of living over winter. Such cases therefore constitute the key to the whole pear blight situation. Cutting them out and destroying them puts an end to situation.. Cutting them out and destroyingg them puts an end to the disease so far as any orchard is concerned. The cutting out has to be skillfully and thoroughly done. A disinfectant has to be carried when doing this cutting and the knives and saws kept thoroughly wiped sterile to avoid spreading the disease. It is also necessary to wipe off the wounds after each cut. For this purpose corrosive sublimate solution with the strength of 1 to 1,000 in water is the best material.

PEACH YELLOWS.

This disease has attracted a great deal of attention in past years. In fact, it has been considered one of the most obscure and difficult diseases in the whole category. It still remains in this class as far as its cause is concerned.

Pathologists have been wholly unable to find out the cause of the disease. On the other hand when it comes to the remedy this disease is the easiest to control and is the most economically combatted of any of our serious orchard troubles. The method of control consists of a thorough inspection of each tree in the orchard during its fruiting period and the prompt removal of the tree by digging it up. The safest plan is to burn the tree on the spot. As a rule the diseased trees can best be found by inspecting them at the time of the ripening of the fruit, but as a general method of procedure it is well to inspect them tree by tree and row by row, three or four times during the season, once in July, once in August and once in September. The best symptoms of this disease are the premature red spotted fruits which occur on the diseased trees, even before they show the

yellow discoloration of the foliage. Later a wiry twig growth occurs and a yellowing of the foliage. The yellowing foliage is typical but hard to describe and is often confused with similar discolorations produced by borers, winter killing, starvation, root aphis and other causes. It will be noted that the last two diseases are controllable by the eradication method.

It might be well to call your attention to the fact that this is an entirely different style of treatment from the spraying which has yielded such excellent results in other lines of orchard diseases. But we have parallel cases in diseases of animals and even in human diseases. While there is no remedy for small-pox, typhoid fever nor yellow fever, yet these diseases are controlled by quarantine and isolation and destruction of the infection centres and the mosquito and flies which carry the disease about, paralleling our destruction of the infection centres in pear blight and peach yellows. In diseases of animals the foot-and-mouth disease of New England and the pleura-pneumonia have been controlled by killing and burying or destroying the infected herds. Greater triumphs have been secured in a way by these quarantine methods than by doping people with medicines. So in our orchard pathlogy; in case of certain diseases like pear blight, peach yellows and the rest of the yellows group, we can achieve greater triumphs by stamping out and controlling diseases than by the more expensive annual treatment by spraying.

Adjourned.

AFTERNOON SESSION.

Edwin W. Thomas, Treasurer, submitted his annual report which was accepted and reported to the Auditing Committee.

The statement showed a balance of $85.15 in the treasury.

Mr. Rakestraw, of Committee on Nominations, submitted the following list of officers for the year 1906.

President, Gabriel Hiester, Harrisburg.
Vice Presidents: Hon. W. T. Creasy, Catawissa; Thos. B. Meehan, Germantown; Dr. I. H. Mayer, Willow street.
Recording Secretary, Enos B. Engle, Waynesboro.
Corresponding Secretary, Wm. P. Brinton, Christiana.
Treasurer, Edwin W. Thomas, King of Prussia.

The aforenamed nominees were duly elected by ballot.

Harrisburg was chosen for next meeting, and date of meeting was changed from Tuesday and Wednesday, January 15 and 16, 1907, to Wednesday and Thursday, January 16 and 17, in order to avoid the crowd and excitement incident to inauguration day which will be January 15.

The following paper was read by Prof. Wm. A. Taylor, Pomologist in charge of Field Investigations, U. S. Department of Agriculture.

THE POMOLOGICAL INVESTIGATIONS OF THE UNITED STATES DEPARTMENT OF AGRICULTURE.

The pomological work of the Bureau of Plant Industry may be roughly divided into two general lines, namely, systematic and economic work, though in fact all the work thus far undertaken in this field has a definite economic relation and practical bearing. The term pomology, which has been variously applied by writers, may perhaps be most accurately defined as the science of fruits and the art of their culture. The science of fruits is largely concerned with the study of their relationships to each other and the determination of their relative adaptability to various combinations of soil and climatic conditions. Only through knowledge of these points can any intelligent forecast of the probable behavior of a variety in a particular region be based, and the risk of failure of varieties in regions new to them be reduced. One of the most important requisites in systematic pomology is an accurate, clear and stable nomenclature. This is necessary in order that the observations of widely scattered observers may be utilized in determining the cultural range of varieties, and the uses to which they are best adapted. In America this question of nomenclature has been and still is of very great importance. Our commercial fruit industry has been developed with such startling rapidity in districts so widely scattered, and from native and introduced species of such diverse characteristics that the workers in systematic pomology have been overwhelmed in the wealth of material available for, and needing their attention. In every new section successively occupied by the pioneers as they have moved westward, old varieties have reappeared under new or entirely erroneous names, which, mingled with those of the new sorts that have originated in the particular sections, have resulted in radical regional differences in the names of varieties in the nurseries and orchards.

A few familiar cases may be cited. The Baldwin apple of New England became Steele's Red Winter in western New York, which name through a mistaken identification later become firmly attached to Red Canada in Michigan, where it still persists in the older orchards. The Yellow Newtown of Long Island, transferred to the warm and fertile mountain coves of Virginia became the Albemarle Pippin of the mountain region below the Potomac River. The Mumper Vandevere of Pennsylvania, grafted in northern Illinois for Yellow Newtown, became the Minkler of that State and the great Mississippi Valley, and has been so widely distributed under that name and so firmly fixed in pomological literature that it takes precedence over the earlier name of the variety; the Napoleon cherry of the European lists is almost universally grown in California and Oregon as Royal Ann; the Pond plum as Hungarian Prune.

Systematic investigation of the apples grown in family orchards reveals the fact that a large proportion of the varieties in them, outside of a few standard commercial sorts, are either unknown by name to the growers or are incorrectly named.

This condition made it necessary that special attention be paid to the nomenclature and identification of fruits in the early years of the Department pomological work. In co-operation with the American Pomological Society, the State horticultural organizations, and the horticulturists of the experiment stations, a fair degree of uniformity in the various names in formal catalogues and volumes has been attained. A large number of public spirited fruit growers and nurserymen throughout the country have generously aided in this work, which is still in progress.

In connection with this work, an invaluable collection of accurate varietal descriptions, photographs, water color paintings and facsimile models and herbarium specimens has been accumulated which constitutes an important feature of the working equipment of the office. The continuous policy of those in charge has been to assemble in this collection all varieties of fruits grown in North America, so that workers interested in pomological questions may have access to them for the prosecuting of their investigations.

Necessarily the identification of varieties from specimens sent by growers and others has become an important feature of the work, the receipts for this and allied purposes having averaged nearly 3,000 lots of fruit per annum during the past five years. Such work is recognized as having a distinct and immediate value to fruit growers as well as a definite bearing on systematic pomological work, so that growers are, upon application, furnished with mailing packages and franks with which to forward specimens for this purpose.

Publication on particular fruits embodying the results of these investigations are in preparation. One, "The Nomenclature of the Apple" (Bulletin 56 of the Bureau of Plant Industry), was issued in 1905. This comprises the known varieties of this fruit referred to in American publications between 1804 and 1904, the first century of American pomology, and includes some 15,000 apple names and synonyms, with tabular descriptions and references to places of origin and first publication so far as determined.

Actual and supposed new varieties, whether yet introduced or not, are received in large numbers from originators and nurserymen for opinion as to their exact identity and their relative value in contrast with sorts already known, also for suggestions of suitable names not previously used.

Such work as this, in addition to a large volume of correspondence upon matters relating to various phases of the fruit industry both systematic and economic, makes up the distinctive office or indoor work in pomological investigations.

FIELD INVESTIGATIONS.

Since 1901, the distinctive field problems in pomology, most of which are of direct economic importance, have been separately grouped for convenience in administration. These comprise those lines which embrace experimental studies of problems connected with fruit marketing, transportation and storage, viticultural investigations, fruit district investigations, and a number of miscellaneous field problems.

Under the general head of fruit marketing, a systematic experimental study of the various questions involved in that subject is

being made with special reference to its bearing on the development of export trade in American fruits. It is becominng very generally recognized that with such fruits as the apple, the pear, the peach, the orange, and possibly some others, the yield in favorable seasons in future is likely to be much larger than has been the case in the past. A wider distribution of the product must, therefore, be accomplished if disastrous gluts are to be avoided. While the larger part of our fruit product will no doubt always be consumed in America, the export is recognized as one of the most important safety valves for surplus fresh fruits.

Series of shipments to British ports have demonstrated the entire practicability of delivering there in sound and wholesome condition, early summer apples, peaches and pears of the varieties best adopted to our domestic markets and at times when our surplus of them are very likely to occur. In a number of instances such shipments have yielded higher net returns than the home markets even in years of high prices at home. In the case of the Bartlett pear in New York a large and in the main profitable, expert trade has already developed along the lines experimentally determined and demonstrated by the Department.

The profitable exportation of peaches is considered a more uncertain matter largely because of the fact that the peach is not yet sufficiently well known to the great mass of population in nothern and western Europe to be in steady and large demand. The fact that in favorable seasons Elbertas from points as diverse in their conditions as Georgia, Oklahoma and Connecticut have been delivered in London in good order, and have netted their growers values nearly or quite equal to home markets, is sufficient to indicate that the field is a promising one. Early apples, from those districts like the Chesapeake Peninsula, which can place their product under refrigeration in the foreign markets within ten days after leaving the tree, are worthy of further attention in particular locatities, especially in seasons when the European crop of summer fruits and the Australasian crop of winter apples which come into competition with them are light.

But far more important than any of these is the export trade in winter apples. In all but our very lightest crops the export demand has in recent years been the most important factor in determining the prices of sound fruit during the autumn and winter. For this reason, particular attention has been paid to such questions as size and style of package, method of packing, suitability of variety to market, etc., as well as to the introduction of American apples to markets where they have not hitherto been used in commercial quantitles. Series of shipments of winter apples from representative apple sections, packed in barrels and boxes, both with and without wrapping, comprising both graded and ungraded fruit, are now being made to the principal European seaports to obtain actual experimental data on these vexed questions, which it is practically impossible for the grower to determine for himself except through long and frequently costly experience. Progress reports of this work are given out from time to time through papers before associations, such as this, and will eventually be summarized in bulletin form for distribution.

FRUIT TRANSPORTATION AND STORAGE.

Under this head a comprehensive investigation of the entire question of the handling of fruits for transportation and storage has been in progress for the past four years. Experiments conducted with the more important commercial varieties of apples, pears and peaches, in some of the leading districts for those fruits have demonstrated the necessity of picking at proper stage of ripeness, carefulness in handing, promptness of forwarding and withdrawal for consumption before the product has past its stage of full maturity. Perhaps no fact developed in this investigation is of greater fundamental importance than this, namely, that the durability and value of fruit destined for cold storage are as vitally affected and as surely damaged by careless handling in any stage of handling or shipping as in the case of fruit destined for immediate consumption. The loss in the former case is, in fact, frequently greater than in the latter, because of the additional expenditure for freight, storage charges, etc., and the inevitable risk of deterioration before an opportune time for sale occurs.

To quote from the report on this work for the last season:

"The experiments during the four years have shown conclusively that a large proportion of the difficulties in apple storage may be overcome by more rational handling of the fruit before it is stored, and by giving it better care in some respects after it reaches the storage house. Apple scald, one of the most serious storage troubles, is not yet well understood, but the experiments have again demonstrated that it can be controlled commercially by picking the apples when hard-ripe instead of prematurely as many winter apples are picked; by storing them quickly after picking, in a temperature of about 31 degrees F., and by selling the more susceptible varieties comparatively early in the season. The premature ripening of apples in storage is often the result of delaying the storage too long after the fruit is picked. These investigations continue to emphasize the supreme importance of quick storage after the fruit leaves the tree. The "slumping" of apples in the barrels due to the development of the common blue-mold fungi in the spring, is generally the direct result of rough handling of the fruit while it is being picked and packed. The skin of the fruit is bruised, and the rots enter and grow vigorously if the fruit is not stored quickly in a cold temperature after picking. The investigations continue to emphasize the need of uniform temperature as low as 31 to 32 degrees F., for long term storage, and of pure wholesome air in the warehouse if the flavor of the fruit is to be retained without contamination. Cold stored fruits are frequently injured in quality through the lack of proper ventilation of the storage warehouse. This side of the storage question needs further investigation, which cannot be satisfactorily made until the Department has an experimental storage plant.

The effect of the environment under which fruit is produced, upon its keeping quality in storage is being studied experimentally with fruit from trees of different ages, in different soils and from different climates. In co-operation with the N. Y. State Exp. Station, a comprehensive investigation of the influence of various methods of culture, such as clean cultivation vs. sod culture, etc., is under way

The comparative value of a large number of varieties of apples from different apple districts has been studied for the past four years with a view to determining their relative fitness for storage.

During the past year a special study of farm storage houses has been inaugurated and will be continued for a sufficient time to obtain light on the relative efficiency and economy of farm storage houses cooled with ice, ice and salt, brine cooled with ice and salt, and mechanical refrigeration in eastern New York. It is believed that in certain parts of the North a distinct advance in fruit storage can be made through the utilization of properly constructed storage houses where the fruit can be held by the owner in first class condition for use as needed by his markets, at less risk and expense than are involved in storage in a plant outside of his personal observation and control.

The practicability of freezing small fruits for use by bakers and confectioners in flavoring ice creams, sherbets, etc., and for use in pies is also being investigated. Such quickly perishable fruits as strawberries and raspberries, which can only be held in good condition in ordinary storage for a very few days are found to be preserved in practically perfect flavor and condition for several months by freezing quickly before they are overripe. This new phase of the cold storage business is already becoming of large commercial importance in some of the larger cities.

FRUIT TRANSPORTATION.

For some time past the conditions directly concerned in fruit transportation have been under investigation, and these have now assumed such importance that they are being given special attention. The behavior of peaches in refrigerator cars as shipped from Georgia and California is being thoroughly investigated, both at shipping point, in transit and at destination. In this connection, thorough tests of the precooling of fruit intended for such shipment are being made. In the case of peaches in Georgia it has been found that a large part of the rot in transit to northern cities occurs in the two upper tiers of carriers in the car, the three lower tiers arriving at destination in sound condition. This unequal condition is unquestionably due to the very rapid cooling of the fruit in the bottom of the car and emphasizes a conclusion previously reached in these investigations that quick cooling after picking is a fundamental requirement in successful cold storage or shipping operations. In both Georgia and California the preliminary work along this line has been done in refrigerator cars on track which were equipped as stationery refrigerators in which the fruit could be quickly reduced from the temperature of the outside air to about 40 degrees F. by the use of ice and salt. Fruit cooled in this way, before being loaded into the cars for shipment, was found to arrive at destination in much better condition and to remain sound longer after arrival at destination than that shipped under ordinary icing, even where well ripened fruit was used in the precooling tests and prematurely picked hard fruit for the ordinary shipments.

This line of work, of course, involves a radical change in some of the present commercial methods of shipping, and further tests are needed before investments in precooling plants could safely be made.

In this connection, an investigation of the causes of decay in oranges and lemons in transit from California to Eastern markets is now under way. The losses from this cause are said to have aggregated not less than half a million dollars a year for several years and to seriously menace the future of the industry. As the result of systematic observation of the practice of growers and packers in the handling of oranges it was discovered early in 1905 that about one-fifth of the orange crop is made susceptible to decay by improper handling before the fruit is packed. These injuries are caused by the puncture of the skin with clippers used in cutting the oranges from the trees, by punctures from stems left too long, by finger nail cuts in handling and by other mechanical injuries in the handling of the fruit in orchards and packing houses. Experiments having demonstrated that from 10 to 50 per cent. of these injured fruits are likely to decay if favorable conditions of heat and humidity develop, growers were notified of the danger, and as the industry is quite thoroughly organized the information was immediately put into practice, with the result that one of the leading growers and shippers of southern California estimated in the spring of 1905 that the Department investigations in that in that section had saved the industry at least $200,000 on the last crop. Extensive tests in precooling oranges, both in stationery storage houses and in cars on track by blowing cold air through them after they are filled with fruit until the temperature of their contents is reduced to a satisfactory point, have demonstrated that with oranges, as with peaches, quick cooling is an important factor in checking the ripening processes and in preventing the development of rots.

VITICULTURAL INVESTIGATIONS.

Under this head a comprehensive study of the relative adaptability of phylloxera resistant stocks to soils is being made in California, where nearly, if not quite $100,000,000 is invested in the viticultural industry. Other allied questions are also under study there in nine co-operative experimental vineyards located in representative viticultural sections of that state. During the past year a special study of the rotundifolia or Scuppernong type of grapes in the south Atlantic and Gulf States has been begun. It is believed that this native species is capable of quick development into an important cultivated type and that its varieties will be found well adapted to the climate and soil conditions of the South Atlantic and Gulf States where other cultivated grapes are grown with much difficulty and at considerable risk of loss by the grower.

FRUIT DISTRICT INVESTIGATIONS.

Under this head a careful field study of the adaptability of varieties of orchard fruits to particular soils, elevations, slopes, etc., is being made with a view to determining through actual observation as well as through the recorded experience of fruit growers the exact conditions under which varieties reach their highest perfection and meet the most evident needs of our markets. This work has thus far been mainly limited to the Allegheny mountain region, from Pennsylvania southward, and the Ozark region of Missouri and Arkansas. In connection with it, exact data on the blossoming and ripening dates of particular varieties in most of the important

fruit districts of the country are being made by several hundred volunteer observers, with a view to securing accurate information on points connected with the selection of varieties for mixed planting when cross fertilization is necessary and for ascertaining the duration and exact time of the blossoming periods for use in those portions of the country where the relation of these phenomena to the average date of last killing frost is important. A report upon this subject covering the South Atlantic States is already in manuscript and will soon be published.

MISCELLANEOUS PROBLEMS.

Under this head investigations of the cultural varieties of the pecan and other nuts are in progress and of the peach and other fruits. A special study of the summer apple industry of the Chesapeake peninsula has been nearly completed, and an investigation of the apple evaporating industry as it exists in the East, both of which are about ready for publication and distribution.

MR. McKAY.—I would like to ask Prof. Taylor as to the standing of "Winesap" in the foreign market.

PROF. TAYLOR.—We have reports that "Winesap" is not a desirable apple in the Glasgow market. In London and Hamburg it seems very popular. During the last two years the foreign markets have been taking "Golden Russets" at higher prices than they paid for red fruit. "Grimes' Golden" and "Jonathan" are generally exported at a loss. "York Imperial" is an excellent export apple especially in German markets, but it is sometimes liable to scald. This tendency is more marked however on fruit from young trees.

The following paper was read by S. Morris Jones, West Grove Pa.:

WHY NOT MORE ROSES?

There are many beautiful flowers, but I believe the rose holds now as it has held in the past, its place as Queen of the Flower Kingdom. Her supremacy is recognized by all classes of our people; her beauty is held as an emblem for comparison, as the highest standard of beauty; anything as sweet-scented is recognized as possessing the height of fragrance.

Almost by intuition it would seem, the minds of the boys and girls who live in the flowerless sections of our great cities are impressed with the idea that the rose is the most beautiful as well as the most desirable of flowers. I have been told by members of the Flower Missions that these children go wild over rose buds and frequently have to be repressed when they are being distributed to them, and that they will choose and be much better satisfied with one or two roses than much larger bunches of other kinds of flowers.

The Flower Missions are doing a noble work—the flowers they distribute carry with them much joy and pleasure and undoubtedly

tend to create aspirations for a better life. How those members of the Flower Missions who witness the joy that one little rose bud brings to the breast of the fortunate recipient must wish that there were "more roses."

The growing of roses is a large industry, millions of them are grown each year for outside planting, and millions of them are planted in parks and private gardens throughout the United States.

Our country is large, however, and although so many rose bushes are planted it is very noticeable as we pass along the streets of our towns and villages and of the suburban parts of our large cities that many of the lawns, I think I might say a large majority of the lawns, appear to have no roses in them. Many of the bushes that are seen are of the hardy climbing class, with the Crimson Rambler, a comparatively new rose more noticeable than any other variety. The hardy climbing roses are very desirable for many places, but they are not the most popular class of roses. We see more of them because they are nearly sure to live and thrive when planted, their vigorous habit of growth enables them to overcome the attacks of insects and fungus, the cold winter weather does not kill their branches and if planted in good soil they will live and thrive for many years without pruning.

The more popular bush or garden roses are planted in much larger qualities than the hardy climbing varities, but the lives of many of them are very short,—not necessarily or intentionally so, but rather for want of a little timely care and attention, on account of which the enemies of the rose bush soon end its life. The list of roses that should do well in our gardens and survive ordinary winter weather is quite a long one, and while they will all thrive and do well in almost any good soil and favorable situation, there is no doubt that some varieties will do better in a particular kind of soil than others. Just what is in the soil to make this difference no one can certainly tell, but we can see by observing the growth of the plants just what varieties make a poor growth, and which ones produce unsatisfactory flowers,—these we should leave out of the collection for our own particular garden.

The rose can hardly be regarded as a fastidious plant, but it is a heavy feeder, the roots absorb a great deal of nourishment, which must be kept replentished by liberal manuring in order to get the best results. This is an important matter and can be better under stood when it is known that the Hybrid Perpetual roses, such as Gen. Jacqueminot, Paul Neyron and Magna Charta, should make a complete new top each year. In other words when these roses are pruned in the spring all the old wood that has borne flowers the previous year should be cut out, and in its place there should be an ample number of strong young shoots to make a new top. If the old top is allowed to remain it appropriates most of the nourishment from the roots so that no young shoots are produced for the following year;—plants pruned in this way,—and I believe it is the way most of them are pruned,—soon lose their vitality and had better be replaced by young, healthy plants.

The prunning of the rose is a very important operation—all experienced growers agree on this point—and they also agree that is is difficult, indeed almost impossible to give definite instructions to the

inquiring beginner or to those who are seeking to improve the methods that they have been following. Each plant is a problem in itself, the eye must see it and it must be studied before the shears are applied, in order to obtain the best results. The one general principal to follow is to satisfy yourself which is the most vigorous part, and with this as a basis for the plants structure trim the weaker branches and cut back the stronger ones, having regard all the time for the shape of the plant. If it is your object to induce larger flowers and not so many of them cut back the stems severely, if you want a larger show of smaller flowers leave the stems or branches longer. The ever-blooming roses such as the Teas, Hybrid Teas and Noisettes require different treatment in pruning from the Hybrid Perpetuals. Their habit of growth is more bushy and branching, and they do not as a rule produce strong young shoots to take the place of the old top, so generally speaking the old top of these varieties should not be trimmed too severely, but the strong stems should be cut back slightly and the weak ones removed.

Roses have enemies and some of them are very persistent. The worst of these are the rose slug, the aphide or green fly, mildew and the leaf spot, commonly known as black spot. To destroy the rose slugs some kind of poison is used; white hellebore, Paris green and a preparation called slug shot are the poisons usually selected for the purpose. I decidedly prefer the white hellebore as it is very effective—much more effective than slug shot—and it does not burn the leaves as Paris green will do if too much is put on. A decoction made of about a tablespoonful of hellebore to two gallons of boiling water, applied when cold, is the most economical way to use it, but is can also be used as a powder or mixed with cold water. During the early summer when the slugs are the most troublesome and when they also do the most harm, it is a good plan to always have this poison ready for immediate application. Powdered tobacco or a strong solution of tobacco should be used to destroy the green fly; it must be remembered that the aphide or green fly increases with marvelous rapidity, and that prompt measures should be taken to destroy it, if tobacco cannot be had it is possible to kill a great many of them by rubbing them off with the fingers.

For the fungus troubles, we use powdered sulphur for mildew, but for the black-spot there does not seem to be any very effective remedy, fortunately the spot attacks the older leaves and if the plants are in vigorous growing condition they will not be seriously hurt by this disease.

I stated that the before mentioned pests are the worst enemies that the roses have, possibly I am wrong in saying so, it may be that the worst enemy they have is neglect, not intentional neglect, but the rose suffers just as much from its effects as if it were intentional. We are very busy people and it is often hard to find time to attend such things as looking after the roses in our gardens. Some of us scold ourselves for not having taken the time, for it requires but a few minutes, however there is always something else to do and the roses do not absolutely have to be attended to. If we could only persuade ourselves somehow to make it a point to attend to the roses with more care in the early summer and keep

them healthy and thrifty at that time, we would have much better plants, for it is then that they need to make a strong healthy growth so that they may have time to mature and harden before cold weather; and then if we get the bushes nicely started and have something pleasing to look at and to show, we are certain to make more effort to keep them in a vigorous, healthy condition.

In what I have said about the trouble that the rose grower may expect, and the remedies that he must apply to correct them, I hope I have not drawn a discouraging picture. The sum of these troubles no doubt gives us a most potent answer to the title of this paper, that is, the enemies of the rose destroy so many plants that we cannot expect to see more roses in our yards and gardens until the lovers of the rose learn to institute a more vigorous campaign against its enemies.

There is a bright side to this rose question in the form of many beautiful rose gardens, I have seen some of them and no doubt all of you have seen others just as beautiful; they are not always visible from the street, but are often located in some chosen spot just out of public sight. I do not mean commercial gardens, but refer to those that have been planted and cared for by the amateur. Some of the prettiest gardens I know of have been and are now cared for by very busy people, who will tell you that it does not take very much of their time to do the work necessary to keep the plants in fine condition, and that they as well as their friends get a great deal of pleasure from them all summer long.

In selecting rose bushes do not always insist on having hardy plants for there are many of the tender and semi-hardy ever-blooming varieties that will grow so well and bloom so continuously during the first season that I am sure anyone should feel well repaid for planting them even if they did not live through the winter. To get the best results the bed must be enriched with well rotted stable manure, cow manure being preferred. I am satisfied that this method of growing roses—choosing the ever-blooming varieties and replacing each spring any that may winter-kill—will become much more popular in the near future. Small own-root roses can be bought very cheap in quantities, in fact they cost very little more than other kinds of tender bedding plants such as geraniums and coleus. Do not suppose that these small roses will not grow into good sized plants and give you lots of bloom the first season, I can assure you that they will if you do your part in caring for them. In thus recommending the small rose plants it is not my intention to discourage people who prefer them, from getting the two year old plants. The two-year old bushes are better for immediate effect, but they cost much more than the one-year size—probably more than many people in our latitude would care to invest in semi-hardy rose plants.

A very good way to protect tender roses during the winter is to cover the ground around the bushes to a depth of five or six inches with leaves, tie the branches of each bush closely together, and put over each bush a keg, barrel or box with both ends knocked out; set the box or whatever is used so that the rose bush will be near the middle of it, then fill up the box with dry leaves, being careful to settle them down around the rose bush, then put a lid

on the box to keep the rain and snow from wetting the leaves. If the bushes are very tender be careful to have at least six inches of leaves all around them. Roses protected in this way are almost sure to pass our severest winters uninjured.

We occasionally have winters when many varieties are hurt amongst the hardy roses, and this sometimes occurs when the winter has not been a very cold one, just what causes the injury at such times we cannot always tell, but I think the sudden change from bright sunshine to cold and from cold to bright sunshine during the latter part of the winter is frequently responsible for it; a severe cold spell after the sap has been excited is also injurious. When the tops of the rose bushes are killed they may entirely recover if they are on their own roots, but when budded or grafted plants are killed down to the roots they are lost; on that account it is desirable to get own-root roses when it is possible.

There are in existence about two thousand distinct varieties of roses, and every year there are fifty or more new varieties introduced. Out of this large collection it is reasonable to suppose that varieties might be found to suit every lover of roses and every condition of soil and climate. If in the future we cannot say that there are more roses in our gardens and on our lawns, there is no doubt that we can at least say there are more varieties of roses.

A sample of a small one year old, own-root Tea rose bush in a $2\frac{1}{4}$ inch pot was shown; also a sample plant, showing the growth that a similar small rose bush had made in one summer. This bush was taken from a bed where 6 bushes of the same variety (Maddalena Scalarandis) were planted May 15. It was not the largest bush of the 6, but was chosen as representing an average size. It was a vigorous bush over 2 feet in height and was well branched. The roses in this bed had shown bloom continuously from June 25th to November 1st. Other varieties will do equally as well, and some that will not grow quite as large, will bloom just as long and as freely.

Being asked how to prevent mildew, Mr. Jones recommended an application of powdered sulphur. For Red Spider a vigorous syringing with cold water is an effectual remedy. This insect is generally worse upon plants that are not of vigorous growth.

A MEMBER.—Is the dwarf "Crimson Rambler" desirable?

MR. JONES.—It is probably the greatest blooming rose we have. It will under proper care bloom all summer, or the entire winter.

The following communication was read by the President:

War Department,
Gettysburg National Park Commission.
Gettysburg, Pa., January 17, 1906.

To the Chairman State Horticultural Association, Court House, Gettysburg:

We wish to extend through you a cordial invitation to view the Gettysburg National Park, Exhibit of Maps, Etc., in third story Winters building, Chambersburg street, Gettysburg.

For the Commission.

E. B. COPE,
Engineer.

The invitation was received with thanks but could not be accepted by the Society for want of time.

The following was presented by the Secretary:

Harrisburg, Pa., December 29, 1905.

Enos B. Engle, Secretary State Horticultural Association, Box 76, Harrisburg, Pa.:

My Dear Sir: I have just received circular of announcement of program for the January meeting of the Society. I doubt much whether I can be present, but matters may so shape themselves that I can be on hand at least a part of the second day.

While in Massachusetts last September, I visited Concord, and near that town succeeded in securing a small branch of the original Concord grape vine. I think there are two buds upon it that will grow. I shall take great pleasure in presenting it to the Association. It is almost impossible to secure any cuttings at all from this remarkable grape vine, but the lady in charge last September very kindly permitted me to break off the piece of the vine which I shall present to the Pennsylvania State Horticultural Society.

Faithfully yours,

H. C. DEMMING,

In accordance with the foregoing communication the branch was presented to the Society with the following note:

"Part of branch from the original Concord grape vine; taken from the vine, near Concord, Mass., Saturday, September 30, A. D. 1905, by H. C. Demming, of Harrisburg, Pa.

"Presented to the Pennsylvania State Horticultural Society, with the compliments of

"HENRY C. DEMMING."

The vine was accepted with thanks in behalf of the Association, and the Secretary was authorized to write Mr. Demming in acknowledgment of the same.

Adjourned.

EVENING SESSION.

Mr. Brown, chairman, submitted the following:

REPORT OF COMMITTEE ON NOMENCLATURE AND EXHIBITS.

Mr. President and Members of the State Horticultural Association of Pennsylvania:

Your Committee on Nomenclature respectfully reports that we have carefully as time would permit, examined the Exhibit of Fruits and Flowers, and take pleasure in commending the exhibit as a whole.

A notable feature of the exhibit, and one to which special attention must be called, is the almost entire freedom of the effects of fungus or the ravages of insects on the fruit exhibit, representing as it does, care in orchard management especially in spraying. The quality, uniformity in size, and high color of the apples of Central and Southern Pennsylvania, are a surprise to those not acquainted with the fruit of this section, and must attract the attention of fruit growers, so that the industry in this section has a promising future.

We suggest to this Association, that it establish a rule, that in the future exhibits of the Society, all imperfect fruit be disbarred from the exhibition tables. Let the State Horticultural Association of Pennsylvania take the lead of the fruit associations of this country in this respect and establish a standard that others can well emulate.

We find there is on exhibition by C. J. Tyson 27 plates containing 7 varieties of apples, two jars of canned York Imperial apples, and one glass jar of jelly made from the parings of the fruit comprising the two jars of canned apples. This exhibits the complete utilization of the product. The special feature of this exhibit is the beautiful York Imperials shown as the perfection to which this fruit can be grown in Adams county.

Geo. H. McKay exhibits one plate of Delaware grown Stayman, and one plate of Ben Davis kept two years in cold storage.

D. C. Rupp exhibits four plates of four varieties. He exhibits a seedling that in size, color and flavor is promising.

John F. Boyer exhibits four plates, four varieties, that were absolutely perfect and had not been sprayed. This fruit, however, is grown in an isolated section, and upon small areas, which is important in that there are still many such conditions in Pennsylvania where apples may be grown for a limited period, at least free from some of the worst difficultues that confront the fruit grower in sections where similar conditions do not exist.

John Kready shows one plate Sheldon Pears, three plates of apples.

Miss Mary M. Haines exhibits one plate apples, one jar figs. W. H. Black, two plates apples.

W. S. Adams exhibits nine plates apples, seven varieties.

President Hiester, 15 plates and 10 varieties apples, 2 plates Lawrence pears.

These two last named exhibits deserve special mention on account of high color and freedom from imperfections. In Mr. Hiester's exhibit we note peculiar form of Smith's Cider Apples which is instructive in that it represents the possiblity of such varieties even in standard varieties that ofttimes makes proper identification extremely difficult. The total exhibit is 77 plates and 40 varieties.

John G. Rush, West Willow, Pa., has a very creditable exhibit of 15 varieties of nuts. His Persian walnuts, "Franquette," "Mayette,' and "Rush Hybrid," a Pennsylvania seedling of his own production, are fine in appearance, of high quality, and are perfect blossom; an important feature in nut culture.

Henry Eicholtz, Waynesboro, Pa., exhibits a collection of carnations among which is a beautiful seedling of his own creation, named "Mrs. W. T. Omwake." He also shows the "Thos. W. Lawson," and recent creations in white, red, pink and variegated colors.

We report this exhibit as a whole is a very creditable one and such as should encourage increased efforts on the part of the Society.

We suggest that the Society offer a certificate of merit as premium for the exhibition of meritorious fruits; believing that this would increase the interest in these annual exhibits.

Respectfully submitted,

A. N. BROWN,
DR. I. N. MAYER,
D. C. RUPP,
Committee.

THE CHAIR.—In the report just submitted Mr. Brown has made a suggestion worthy of consideration, and I hope that it will be considered by this Society. I refer to the question of premiums for exhibits. I hope some one will make a motion so that the matter may be taken up for discussion.

MR. BROWN.—I move that this Society be authorized to offer certificates of merit to worthy exhibitors. In our Home Society we did not have sufficient funds to offer cash prizes and in order to encourage exhibitors we gave certificates of merit which to many were of greater value than cash premiums. I have just received a letter from my son who has been attending this week a meeting of the Peninsula Horticultural Society, and he states that one exhibitor had two 60 foot tables covered with his own display of fruit. We have had exhibits of as many as 1,000 to 1,200 plates of apples I would suggest also that at future exhibits all imperfect fruit be debarred from our tables. We don't want to encourage the growing of imperfect specimens. We are the best people in the world and deserve the best that can be had. I realize that this is a new departure for this Association and I hope no action will be taken without discussion.

THE CHAIR.—I have noticed for several years that usually the best plate of peaches was grown in a village lot, and the best plate of quinces was always grown in a village lot. I am in favor of according to such exhibitors some kind of recognition, and we could better afford to give certificates of merit than cash. I can hardly agree with Mr. Brown that all imperfect fruit be debarred at our exhibits. Sometimes such specimens serve a valuable object lesson by way of comparison.

Mr. Brown's motion was adopted and the matter was referred to the executive committee for arrangement of details.

THE CHAIR.—We have as a guest of this Association Mr. Skillman, president of the New Jersey Horticultural Society. He has been very quiet since he is here and few have known of his presence We will have the pleasure of hearing from him.

MR. SKILLMAN.—I have been having a good time since I am here and would rather listen than talk. I am glad to be with you

and am here because I want to be. Our New Jersey Society wanted to send me elsewhere, but I preferred to come here because I had been at the Bendersville meeting and wanted to return to see and shake hands with my friends from there especially the Tyson family. They are all kind and hospitable and cannot help it. I also met your President there, and had him come to our meeting in New Jersey, where he made a good speech.

Another reason why I came here was to see this old and historic town which figured so prominently in the civil war. You have had a good meeting and a splendid exhibit, and I have found your discussions interesting and instructive. I believe in visiting meetings of this kind and in an interchange of courtesies among our societies. We ought to co-operate and work in harmony because much can be accomplished by co-operation and united efforts. If we act as one body we can generally get what we want. Rural residents are about the only people who do not act in unity for what they want. Fruits should have a protective tariff, and our produce should have protection as well as the products of our manufactures. Foreign fruits come in direct competition with our own. Owing to freight discrimination California growers can sell their fruit at a profit in competition with our eastern fruit. They can grow it cheaper than we, and the government aids them in irrigating their lands free or at a nominal cost. We should unite also in a demand for a parcels post, and with rural mail delivery we would be brought in closer touch with merchants in large cities. We need laws also to protect us from the modern automobiles, who drive so recklessly over our public roads endangering life and virtually driving your wife and daughter off the road for safety. We have in New Jersey a law which does not permit us to protect our property from birds. I do not believe such a law is just. We can protect our homes or our stables from thieves and robbers, but dare not protect our orchards or gardens from destructive birds. If we shoot or kill one we are liable to a fine of ten dollars. A man near Boundbrook found a young robin one day that had been blown out of its nest by a storm. A little girl kindly took the little bird into the house to feed and care for it and for so doing was fined twenty dollars by the deputy game warden. An extensive pea grower said the birds destroyed for him one season a hundred bushels of peas worth two to three dollars per bushel. These are evils that should be remedied and by co-operation we may be able to obtain redress.

There are many ways in which we can benefit by a cordial co-operation. It encourages a kind and sympathetic fellowship that makes the world a kin. We should all be bound together and work together for the common good.

The following resolutions were adopted:

Whereas, The fruit interests of Pennsylvania are of great importance and demand proper development and can be developed only by the State giving them the recognition and interest they deserve; therefore, be it

Resolved, That we the members of the State Horticultural Association, do hereby express our earnest desire for the next State Legislature to establish a Division of Horticulture of the Depart-

ment of Agriculture, to give us needed help with varieties of fruits, methods of cultivation, fertilization, pruning, thinning, harvesting crop, packing, storing, shipping, combating diseases, etc.

Resolved, That we shall ask our legislators and all possible kindred societies to work for the establishment of such an office, properly filled by a competnent horticulturist.

Whereas, We the members of the Pennsylvania State Horticultural Association realize the need of pure materials in making fungicides and insecticides and desire and need legal protection in this regard; therefore, be it

Resolved, That we urge State legislation providing strictly against the adulteration of materials sold as fungicides or insecticides in this State.

Be it Further Resolved, That we shall place this subject before other Horticultural and Agricultural Societies to secure their aid in suppressing the sale of adulterated insecticides and fungicides.

MR. SKILLMAN.—We also want a uniform package law, which should be the same in all states. As it is now Delaware has one standard for fruit packages, and New Jersey another. There should be a law so strong that there could be no evasion and all should be compelled to use the prescribed legal packages.

Mr. Brown and Mr. Tyson also favored the enactment of such a law.

The following resolution was read and adopted:

Resolutions Concerning the San José Scale.

Whereas, The San José Scale has invaded our community to a worse extent than was believed until the State inspectors commenced to examine our trees, and

Whereas, We have been helped by the efforts of Prof. H. A. Surface, State Zoologist, and have confidence in his methods; therefore, be it

Resolved, That we, the members of the State Horticultural Association, do hereby express our appreciation of the labors of State Zoologist Surface and his inspectors and demonstrators and further express to the Governor our thanks for the help he has given us by appointing such men to these important offices and ask continued support for them in their important line of work, and recommend them to the confidence of the public.

MR. C. J. TYSON.—I would like to hear from Mr. Brown on the subject of spraying and spray mixtures.

MR. BROWN.—I have had some experience in this line and am sometimes called a Lime, Salt and Sulphur crank. I have used this wash most extensively and have had considerable success with it. Have also used 'Kil-O-Scale' with some success. Last fall I used 'Scalecide' and found it very effective. I applied at the rate of 1 part to 20 of water. Made application last week in November and upon examination ten days later concluded that 80 per cent. of the scale had been killed. Three weeks later nearly all were killed; subsequent examination show that results were satisfactory. One report read here to-day claimed that 96 per cent. had been killed with it.

We are destined to have more trouble with the San José Scale in the future than we have had in the past and are looking for some cheap and efficient wash that will do the work, and be more convenient to handle and prepare than lime, sulphur and salt. If I were to live twenty-five years, and would be obliged to grow fruit by spraying with lime, sulphur and salt, I think I would go out of the fruit business.

If the soluble oils can be furnished at a reasonable price, and their continued use does not prove injurious to trees, they are destined to come into popular favor. I am hoping that they will prove the 'Moses' that will lead us out of the wilderness.

MR. McMILLAN.—I have been much interested in Mr. Brown's remarks since I have had some experience in the use of the different spraying materials. I have used the soluble oils, and while I have seen some good results where strong percentages were used, on the whole, they have not proven so effective as the lime-sulphur-salt. I have had first-class results with the latter material on peach and plum especially, though not quite so good on apple. On peach trees near Harrisburg, sprayed last week of April, 1905, with regular Lime-S.-S., it was impossible to find any young crawling scale in July and August. These trees were badly infested with living scale before spraying. I do not see what better results one could expect than this. Mr. Brown speaks of killing 95 per cent. to 97 per cent. of the scale with soluble oils. If one per cent. of the scales on a moderately infested tree be left alive the results may not be considered satisfactory, and in some of our experiments less than one per cent. were left alive. Five per cent. or even two per cent. of live scales remaining on a tree will be sufficient to reinfest it badly by September or October.

I have been in Blair county recently where there are a number of orchards containing from one to five thousand trees and where they have been spraying with the lime-sulphur-salt wash, there is little or no scale. In addition to being an effective insectiside the L.-S.-S. is a valuable fungicide, as we heard Prof. Waite declare in his lecture. This was very evident upon the trees in Blair county from the appearance of the foliage and general condition of the trees. The bark was bright in color and smooth in appearance, with none of the characteristic brown blotches of the Monilia or "Brown Rot." Near Frankstown, Blair county, the owners of a large orchard have sprayed their trees regularly every spring with L.-S.-S. There is no scale to be found on them but the owners declare they will continue to use this material every year simply because of its value as a fungicide.

One great objection to the commercial oil preparations is their excessive cost, which operates against their introduction for general use. It seems unreasonable to sell a preparation of this kind, that is nearly pure oil, at $1.00 to $1.50 per gallon when refined petroleum can be bought at 15 cents a gallon retail. Even when sold at 50 cents, the mixture when diluted will be more than twice as expensive as lime and sulphur, and this amounts to quite an item in large orchards. Many persons hesitate considerably on the expense of spraying. I have heard Prof. Surface and others express their opinion that nearly all of these ardent advocates of commercial in-

secticides are interested directly in a percentage on their sales. It would also seem so in this case. Further careful experiments will be made however, and if it can be proven that the oil remedies are as effective as L.-L.-Salt, they will doubtless come into more general use on account of their convenience. There are several reasons why Prof. Surface is recommending and using the Lime and Sulphur Mixture in his demonstration work throughout the State. In the first place the materials can be obtained in every locality at comparatively low cost and every one is familiar with them. In the next place, the wash is easily prepared. As Prof. Waite has said: "There is no great mystery about preparing boiled lime-sulphur-salt." It can be "slung together" quickly in almost any approximate proportions and if boiled thoroughly, for an hour or more, will do its work.

I met some men who used the self-boiled mixture on a number of plum trees early in November and when examined six weeks later they found only 10 or twelve live scale on each tree. This material was prepared in a barrel and such care taken to conserve all the heat that it was really more trouble than boiling in a kettle. It is not hard to apply in spraying if well strained, and it will certainly do the work. This is the concensus of opinion from all the experiment stations in the U. S. when it has been tested, which is more than can be said for some of the soluble oils, or any other material. Another very good reason we recommend L.-S.-S. is on account of its alsolute harmless effect on all kinds of trees in dormant condition. Oils of any kind are dangerous in the hands of an inexperienced person, and a large number of our farmers who want to save their trees have never seen a spraying pump. There are other good reasons why we use and recommend the L.-S.-S. mixtures, but I have given you enough to show our position on this subject.

MR. BROWN.—I do not want to be understood as taking exception to the use of Lime, Sulpher and Salt. Prof. Surface has assumed a wonderful responsibility that will require signal ability—and he has done, and is still doing his work well. His organization is superb, and for his purpose the Lime-Sulphur wash is the best and safest material he could use, and I would have done the same under similar circumstances. However, there is a demand for a spraying material that is more conveniently handled and applied than this mixture, and that can be sold at a reasonable price. The expense of the oil mixture is more apparent than real. They cost more per gallon, but it must be remembered that their spreading capacity is forty per cent. more, and that they are more easily applied. I am expecting that we will yet evolve a soluble oil mixture that will really be cheaper than anything else, and that will prove entirely satisfactory. Until then the Lime, Sulphur and Salt wash must stand as the sovereign remedy.

The following resolutions were read by Mr. Hartman and unanimously adopted:

Resolved, That the State Horticultural Association desires to express its sincere and hearty thanks to the Commissioners of Adams county for their interest and kindness in granting the use of the court house for our meeting; also to the Fruit Growers' Association of Adams county for its valuable aid in making such a success of our meeting.

Resolved, That this Association commends especially the fine display of fruits, cut flowers and potted plants, and extends heartiest thanks to the members and friends who have given such great care and assistance in bringing and arranging them.

Resolved, That the Association greatly appreciates the assistance rendered by the experts and specialists who have helped to make this annual meeting interesting and profitable.

(Signed) D. M. WERTZ,
D. L. HARTMAN,
D. K. McMILLAN,
Committee.

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OF

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STATE HORTICULTURAL ASSOCIATION OF PENNSYLVANIA.

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Koons, Dr. P. R., Mechanicsburg.
Kready, John, Mount Joy.
Kready, W. S., Mount Joy.
Kraybill, S. S., Mount Joy.
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Purvis, Timothy, Hunsecker.
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Rakestraw, Thomas, Kennett Square.
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Root, J. W., Manheim.
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Snavely, H. H., Lancaster.
Snavely, J. R., Harrisburg.
Snavely, M. H., Cleona.
Stein, Geo. E., East Prospect.
Stephens, A. W., Lewisburg.
Stoney, R. J., Jr., 424 5th Ave., Pittsburg.
Stout, W. H., Pinegrove.
Stover, F. S., Bowmansville.
Stroud, J. W., Black Walnut.
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Swartwood, W. H., Falls.
Thomas, Ernest K., University of Pennsylvania.
Thompson, Dr. S. Y., Danville.
Traver, F. E., Wyebrook.
Tyson, Edwin C., Floradale.
Tyson, Chester J., Floradale.
Tyson, W. C., Guernsey.
Wagner, Geo. A., Alinda.
Wallings, Don, Clifton Heights.
Watts, Prof. R. L., Scalp Level.
Weast, Geo. B., Harrisburg.
Weidner, A. I., Arendtsville.
Weise, H. B., Parkesburg.
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REPORT

OF THE

FORTY-EIGHTH ANNUAL MEETING

OF THE

STATE HORTICULTURAL ASSOCIATION

OF

PENNSYLVANIA

Held at Harrisburg, Pa., January 16-17, 1907.

Gauged by the attendance at our sessions, the interest manifested in our papers and discussions and the practical information elicited therefrom, and the large and attractive exhibit of fruits on our tables, this may justly be considered the most successful meeting we have held in a decade, if not in twenty years. It is an evidence of an awaking interest in fruit growing and horticulture in Pennsylvania, which promises to place our own State before many years, where she rightfully belongs, at the head of all others as a fruit producing State.

The following have become members of our association since our last annual meeting.

LIFE MEMBER.

H. C. Cummings, Sunbury, Pa.

ANNUAL MEMBERS.

Banks, William, Mifflintown.
Barlow, Thos. W., Fort Washington.
Bostwick, D. C., Ripley, N. Y.
Bretz, Robert, West Fairview.
Claar,, W. M., Queen.
Denning Co., The, Salem, O.
Fassett, F. H., Meshoppen.
Fenstermaker, P. S., Allentown.
Gass, W. J., Paximos.
Greist, C. H., Guernsey.
Gross, Joshua W., Harrisburg.
Grove, W. E., York Springs..
Gump, Dr. S. H., Bedford.
Harshman, U. W., Waynesboro.
Harris, Joseph, Shamokin.
Hartman, L. E., Etters.
Hartley, A. D., R. D. No. 3, Pottstown.
Hess, Chas. C., Phillipsburg.
Jamison, J. E., Swales.
Kready, W. S., Mount Joy.
Lee, Ross F., Bedford.
Lesher, C. M., Northumberland.
Lewis, W. J., R. D. No. 1, Pittsburg.
Martin, Hon. A. L., Harrisburg.
Prickett, Josiah W., Biglerville.
Richardson, F. W., Paoli.
Rinehart, Geo. W., R. D. No. 4, York.
Rumble, W. H., Ringtown.
Ruof, Fred., Hummelstown.
Snavely, M. H., Cleona.
Stephens, A. W., Lewisburg.
Stroud, J. W., Black Walnut.
Thomas, Ernest K., Botanic Garden: University of Pa., Philadelphia.
Tyson, W. C., Guernsey.
Wood, J. C., Stroudsburg.
Youngs, L. G., North East.

After the usual preliminary work of calling to order, reading and approval of minutes, and a short recess for payment of dues, President Hiester stated that the election of a committee to nominate candidates for the several offices for 1907, was in order, and the following were elected members of said committee:—Dr. J. H. Funk, A. I. Weidner, D. L. Hartman, D. M. Wertz and F. H. Fassett.

The committee was instructed to nominate candidates, and report at the morning session.

In the absence of Chairman R. L. Watts, Mr. D. K. McMillan, read the following:

REPORT OF THE GENERAL FRUIT COMMITTEE.

In presenting a report of the General Fruit Committee, the Chairman wishes to thank the correspondents throughout the State for their prompt and very necessary assistance. It is hoped that the report will not only relate to the results and progress of the past year but will also be an index, to some extent at least as to the general trend of fruit culture and gardening in Pennsylvania, and the possibilities for extended operations in every county. There may be over-production some years in a few sections but the possibilities of the State as a whole are almost unlimited for the production and profitable disposition of first class fruits and vegetables.

APPLES.

The apple is without doubt the most important fruit crop in Pennsylvania. It is grown in every county for home consumption and grown in every county to a greater or less extent for commercial purposes. It well deserves the study and attention of practically all our land owners and it is destined to occupy a much more important place in the horticulture of our State. Some sections are much better adapted to this fruit than others and the industry is developing rapidly in some of these favored locations. There are hundreds and hundreds of acres, however, where soil and climatic conditions are well adapted to the apple and where no special attention is given this fruit. The apple industry should be developed in these sections.

The 1906 crop was above the average in yield. Quite a number of counties report very large or full crops. A good crop is reported from many counties and correspondents in very few counties report less than an average crop. The yields in the greatest apple producing counties as Adams, Franklin and York was not above the average and a number of growers report very light crops. The quality of the crop in most sections was above the average being very good in many counties. Only six correspondents report a crop of poor quality.

In reply to the question, "Is the crop profitable in your county?" only two correspondents give negative answers. This almost unanimous affirmative answer indicates in a very positive way the great possibilities for apple culture in Pennsylvania. Unfavorable weather conditions, particularly late spring frosts, were the direct causes of failure in some orchards the past year, but the trouble on too many

farms arises from negligence. We cannot expect to get paying crops of choice fruit without intelligent and persistent work in the way of tillage, pruning, fertilizing and spraying. The San José Scale is a serious enemy to our orchards and this pest must be fought, but spraying alone will not procure good fruit. Two-thirds of the correspondents indicate that apple trees in their respective counties are dying rapidly and it is doubtful whether the San José Scale is so much responsible for this loss as some other factors, particularly the lack of proper fertilizing and the failure to cultivate or mulch.

The consensus of opinion regarding the five most profitable winter varieties is as follows:—Baldwin, York, Imperial, Northern Spy, Rhoad Island Greening and Ben Davis. Staymans' Winesap, which is receiving so much attention at the present, is reported as one of the five best varieties by correspondents in Berks, Lancaster, Chester, York and Franklin counties. Reports show that commercial planting is largely on the increase in Pennsylvania.

PEARS.

The 1906 pear crop was fairly encouraging. Only a very small percentage of the correspondents report a full crop and 25 per cent. report a fair crop. The crop was light in most counties although the quality was above the average. Commercial planting is very evidently on the decrease in most counties. To every grower reporting an increase in pear planting, four report a decrease. Blight is by far the most serious enemy to the pear and the reports show this in the most emphatic way. The discouraging phase of this subject is that science is giving us practically no new light relating to the combat of the disease. It is the great barrier to pear culture and few large plantations will be made until more is known regarding its control. As to varieties, Bartlett and Kieffer are the leading commercial varieties grown in the State. Seckel, Clapp's Favorite and Duchess receive favorable mention quite frequently.

PEACHES.

The peach crop was very light in most of the counties. Absolute failure is reported from many of the colder counties of the State, while a medium crop was harvested in the more favorable central counties. Lehigh and some of the south-eastern counties produced large and satisfactory crops, especially in Franklin, Montgomery, Lancaster and Chester counties. Weather conditions were not favorable in most of the counties. In a number of counties winter freezing destroyed the fruiting buds and late Spring frosts added to the work of destruction. The San José Scale, "yellows" and borers are universally recognized as the most serious enemies. Peach culture is regarded as decidedly profitable in the State where prevailing natural conditions are favorable.

PLUMS.

The 1906 plum crop in Pennsylvania was far from being a success. Only four counties report a large crop, namely, York, Lancaster, Montgomery and Lehigh. In every other instance either a light crop is reported or a total failure. Unfavorable weather conditions as severe winter freezes, late Spring frosts and wet weather de-

creased the yield in some counties, while diseases and insects were more generally responsible for the light crop. The consensus of opinion is that the curculio is the most destructive insect pest to plums and the San José Scale takes second place among the foes. Abundance, Burbank, Lombard and German Prune are the most popular and profitable varieties grown in the State. But there seems to be very little interest in commercial plum growing and very few trees are being planted with a view to supplying fruit for market purposes.

QUINCES.

According to reports of our correspondents the outlook for quince culture is no more promising than a few years ago. Our Lancaster county correspondent thinks the outlook is encouraging in that county, but no other grower takes an optomistic view of the question. The most serious obstacle to quince culture is twig blight.

CHERRIES.

Cherries are quite universally grown in Pennsylvania and a large majority of the correspondents state that the crop is grown profitably in their respective counties. It is especially successful in most of the more hilly counties where the climate is not too severe, and the industry should be developed in these favored localities. The sour cherries, such as the Early Richmond, may be produced and is produced under a great variety of soil and climatic conditions but this is not true of the varieties producing the largest and finest sweet cherries. The finest large sweet cherry requires a peculiar fitness of soil and climate and the area of our State where such a combination is afforded is rather limited. The industry deserves special attention in these communities. A neighbor in Cambria county grows as fine Windsor cherries as were ever grown in California, and the quality or flavor surpasses the California fancy cherries. The following varieties are most largely grown in our State: Early Richmond, Black Tartarian, Gov. Wood, Montmorency Large, English Morello, Dyehouse, Yellow Spanish and May Duke.

GRAPES.

Commercial grape culture in Pennsylvania, is confined almost entirely to Erie county. There are isolated growers here and there in various parts of the State who grow considerable quantities of grapes for market, but most of our farmers and horticulturists are interested in the production of this fruit for home consumption. The grape is certainly one of the most delicious and refreshing of all our fruits and every farm should contain at least a few vines. Concord will give fair results in almost any soil, while there is an extensive list of varieties which will do well over a large part of our State. The following varieties are especially desirable, according to the views of the correspondents: Concord, Niagara, Brighton, Delaware, Moores Early, Worden and Brilliant. The Chairman of this committee, who has fruited the Brilliant, is particularly impressed with the fine quality of this grape. It is a cross between the Delaware and Brighton with the size of the Brighton and the quality of the Delaware.

SMALL FRUITS.

Oevr half the correspondents report that small fruit culture is on the decrease in Pennsylvania. This is a deplorable fact and it is hoped that new interest will be taken in small fruit culture during 1907. The following varieties of strawberries are mentioned the most frequently as being the best: Bubach, Gandy, Wm. Belt, Sharpless, Brandywine, Warfield, Haverland, Glen Marr, Tennessee Prolific, Sample and Senator Dunlap. Cuthbert stands very much in the lead as the best red raspberry and Gregg occupies first place among the black caps. Cumberland is coming to the front rapidly and is now quite generally grown in the State. Kansas, which was so popular a few years ago is mentioned by only three correspondents. Snyder is regarded as the most profitable blackberry, followed by Erie, Kittatinny, Taylor and Ancient Briton.

VEGETABLES.

Trucking or market gardening is profitable in Pennsylvania, wherever desirable markets can be found. The crops which may be grown on the greatest variety of soils are generally recognized as the most profitable. The following vegetables are favorably mentioned the most frequently: Cabbage, tomatoes, potatoes, onions and celery. A distinctly sandy soil, which is necessary to follow a general line of trucking, is not required to grow any of the foregoing vegetables, and it is surprising that scores of our markets are poorly supplied with home grown produce. Almost every correspondent speaks of the opportunities in his county for market gardening.

SPRAYING.

At least 80 per cent. of the correspondents report that spraying for insects and fungous diseases is on the increase. This is the most encouraging part of the communications which the Chairman of this committee has received. It is an assurance of better days in the future, for those who have been spraying with care, thoroughness and intelligence have been well rewarded for their work. In reply to the question "What are the results of spraying?" we note these answers: "good", "very good", "fine", "satisfactory", "excellent", "holding scale in check", etc., etc. Of course some have been disappointed but failure in most instances has been due to improper insecticides or fungicides or faulty methods in their application.

THE SAN JOSE SCALE.

There is no doubt about the San José Scale being spread quite generally over the State. Some growers report that they do not know of its presence in their counties but the investigations of Prof. Surface and his assistants show that there are comparatively few sections where this pest does not exist. That it is very much more prevalent in some counties than others is well known by the immense losses which have been sustained in these scale swept counties.

Very little is being done to control the scale where the damages have not been especially noticeable. These localities need a warning that the fruit growers or farmers will not forget, for certainly preventive measures should be taken before the scale gains a strong

hold. When isolated trees are found which are badly infested the best thing to do is to destroy them as soon as discovered.

The question as to the best spraying material to use is yet unsettled in the minds of many orchardists. It is quite generally agreed among the entomologists of our country as well as among many practical fruit growers, that the lime and sulphur spray is the most effective of all applications, and it is most extensively used in Pennsylvania. And yet some of the commercial preparations are attracting great attention and well deserve the consideration of both practical and scientific men. The soluble oils, particularly "Scalecide," has been found very effective in the hands of a few of the leading members of the Pennslyvania Horticultural Association. Our Secretary, Mr. Engle, reports favorably concerning the value of "Scalecide" and "Target Brand." Mr. J. H. Ledy, of Franklin county, has been well pleased with the effects of the soluble oils. Mr. Henry T. Moon, of Bucks county, says "Scalecide" is excellent and Joseph W. Anderson, of York county reports that "Scalecide has given better results than lime, salt sulphur." In connection with these statements the fact should be emphasized that lime and sulphur or lime and sulphur with salt added is giving excellent results in our State and elsewhere, where pure materials are used, boiling and mixing properly done and the application thorough.

COMMERCIAL FERTILIZERS.

Commercial fertilizers are used quite extensively by the fruit growers of our State and where used intelligently the results have been highly satisfactory. There is a wide difference of opinion as to the best formula for each particular fruit. One grower claims that a fertilizer containing not less than 15 per cent. of potash should be employed for apples on his soil, while another advocates only 2 per cent. of potash. The question of what to use and the proportion of the various elements is largely a local question with each grower and it is practically impossible to find on the market those brands of fertilizers which are best adapted to the various soils and fruits of our State. This renders home mixing highly desirable, for it gives the grower absolute control of the whole question. He can mix the food to suit the land as well as the crop, and actually save from five to ten dollars per ton. Home mixing has also a decided educational value which should not be overlooked.

TILLAGE.

The reports of our correspondents on the subject of tillage are very interesting. Little attention is given our general farm orchards in the way of cultivation, for the trees usually stand in sod and the results are far from satisfaction in most cases. Then there is quite a large class of commercial fruit growers who are very rigid in their ideas, that thorough tillage should be given all orchards, maintaining the supply of humus by the use of manure, or more commonly by the use of cover crops, preferably legumes, as the red clover or crimson clover. This method finds little criticism for it not only secures good fruit, but also keeps the soil in a fertile condition. Quite a large percentage of our correspondents this year report excellent results from mulching, particularly when the trees

are young, and when in bearing, too, if the necessary mulching material can be procurred. Mulching is especially desirable for rough, hilly lands which cannot be cultivated without serious loss by washing. It is a question whether mulching material could not be bought, if necessary, and applied on level lands cheaper than by continuous cultivation followed by green manuring. It is quite generally conceded that peach orchards should receive thorough cultivation.

SCHOOLS.

It is gratifying to report that nature study is receiving increased attention in the public schools and that elementary agriculture is taught to a slight extent. The school grounds are better cared for than formerly and these are all positive indications of progress in the rural communities. Although good work along these lines is being done, it is purely voluntary on the part of the teacher and no particular influence is brought to bear on school teachers to show how necessary it is to country life. We cannot expect many of our boys to become farmers and practical horticulturists and to find real joy and happiness in their work unless they are taught concerning the beauties and mysteries that surround them in their every day life and know something of the fundamental principles of agriculture and horticulture.

R. L. WATTS,
Chairman, General Fruit Committee.

THE PRESIDENT.—I noticed one statement in the report just read, that is the decrease in commercial pear orchards in the State. One of the leading, if not the leading cause is blight, and there seems to be so little known as to its cause or treatment, that little is or can be done to prevent it. Bartlett, Seckel and Duchess have blighted least with me, while Clapp's Favorite has suffered badly, as also Buerre d'Anjou.

MR. JAMISON.—Many yeers ago I was growing pears to some extent, and a man who called to see my orchard, advised more cultivation and barnyard manure. I took his advice and had more blight that year than ever before. I have been avoiding that kind of fertilizer since, as I do not think it good for pear trees.

MR. DAVIS.—I would like to know what remedy this society would recommend for blight. With me it is one of the greatest obstacles to success. I have had more blight the past year than ever before, and Duchess and Bartlett blighted worst.

MR. ATKINSON.—There seems to be no remedy for blight, and I hesitate to suggest anything. I have about 40 acres in pears, and while Bartlett has blighted badly, have had least trouble with d'Anjou, Seckel or Kieffer. D'Anjou is usually very susceptible, and why it has almost entirely escaped with me I do not know. My orchard generally gets a good coat of barnyard manure and I have had as little blight as anyone in that locality. Having lost about 50 trees in 20 years on 48 acres. Clapp's Favorite and Belle Lucrative have blighted most. When they show signs of blight I usually take out the tree and consign them to the brush heap. I do not think our

scientific men could be better engaged than in trying to find the cause and remedy for blight.

MR. HALE.—I was much interested in the report just read, especially that part relating to Cherry culture, and I am pleased to hear that in many sections of the State it can be grown successfully. There is a splendid market in our eastern cities and the crop is a profitable one. As to spraying for San José Scale, and the comparative merits of lime-sulphur, and the soluble oil mixtures, it must be remembered that the former is being used solely on its merits and that no one is interested in pushing its sale. There is no doubt the oil sprays will kill scale, but that is all they will do, and they do not have the fungicidal effect of the lime-sulphur mixture. I have also found that where this material is used for a series of years there is less blight.

MR. BROWN.—I can hardly accept Mr. Hale's statement as to blight. It is claimed that it is a bacterial disease and that 95 per cent. is transmitted through trees in bloom.

MR. HALE.—My reason for the statement is that lime-sulphur secure a healthy growth of foliage and thus the trees are more resistant to disease.

DR. FUNK.—I not only consider lime-sulphur one of the best insecticides, but a great fungicide. I have never had a case of leaf curl since I use it.

MR. ATKINSON.—I have probably sprayed as much as any one in this hall, and my experience is that failure is usually owing to want of thorough application. I generally use two lines of hose with four nozzles on each, and furnish power with a gasoline engine. I do not find a fine spray best. The trees should be thoroughly soaked or drenched especially with the lime-sulphur mixture.

MR. WERTZ.—I have always been told that the finer the spray the more thorough the application. Now it is claimed that the coarser spray or nozzle is best.

MR. YOUNGS.—I use the "spray motor" nozzle, about 6 to each line of hose. It throws a fine spray and gives best results. There is great waste of material with the coarse spray.

DR. FUNK.—The coarse spray is too much like a fire extinguisher can spray in less time and with less material using a fine spray with 100 to 125 lbs. pressure per square inch.

MR. BROWN.—This is one of the best reports of General Fruit Committee I have ever heard, and is of great importance to the horticultural interests of the State. I think the Secretary of Agriculture should be asked to have twenty or thirty thousand copies printed at once for general distribution. It contains much of interest not only to our own members but to all who are engaged in fruit culture.

THE CHAIR.—Will Mr. Hale give us some information as to the demand and best market for cherries?

MR. HALE.—The markets are usually well supplied with sour cherries, but not with sweet varieties, and they are always in demand at good prices if large and in good condition. I think the 10 lb. grape basket one of best packages in which to ship and sell them.

MR. ATKINSON.—In Philadelphia markets sweet cherries will always bring a good price. Nice fruit sold at 10 to 15 cents per lb. last season. I think the 5 lb. grape basket the best package.

MR. YOUNGS.—Will Mr. Hale tell us why so many cherry trees fail.

MR. HALE.—No doubt much of the trouble is owing to the stocks upon which they are budded or grafted. In our nurseries most cherry trees are grown on French or Mohaleb stocks, while they should be grown on our native or mazzard stocks. They are more difficulty to start on the latter and that is why so few are grown in our nurseries. When once established on Mazzard roots or stocks, the trees will live longer and do better than on Mohaleb stocks.

PROF. WARREN.—As to pear blight it has been proven that it sometimes gains a foothold through a wound or break in the bark. It is also carried by bees when in bloom. As a preventative, cutting out the affected twigs is not always satisfactory. Would advise cutting back in winter and spraying with lime and sulphur. It is a mistake to use barnyard manure, as it makes tender sappy twigs, which are susceptible to the disease.

The Chair appointed the following committee on Nomenclature and Exhibits.—J. E. Jamison, J. G. Engle and J. Hibbard Bartram.

THE PRESIDENT.—We have with us this afternoon Secretary Martin, of the Deparment of Agriculture, and will be glad to hear from him.

SECRETARY MARTIN.—I did not expect to be called upon for a speech and will occupy but a minute of your time. I am greatly interested in your society and have enjoyed the practical discussions you have had this afternoon. Our horticultural interests are second to no other in the Agricultural Department of our State and deserve aid and encouragement. I am busy now with our Farmers' Institutes and find in them an increased interest in everything that pertains to horticulture and a demand for the consideration of horticultural topics. I feel that the interest is growing and I expect to see soon in Pennsylvania commercial orchards of which the world will be proud. We have the soil, the conditions and the men to carry this work to a successful termination. I thank you for your attention.

The Secretary read a communication from Henry E. Reed, Director of Alaska-Yukon-Pacific Exposition, to be held at Seattle, in 1909, which was accepted and approved.

A communication from James Handly, Quincy, Ill., Secretary of "Mississippi Valley Apple Growers Association," recommending the third Tuesday in October annually and perpetually as "National Apple Day," and suggesting also the propriety of recommending the apple blossom as our National Flower; was also read, and though not formally adopted the ideas advanced were endorsed by the society.

Adjournment.

WEDNESDAY JANUARY 16.—EVENING SESSION.

Having called the meeting to order, President Hiester, referred briefly to the "Question Box" on the Secretary's table, and reminded the members that it was their privilege to use it.

ANNUAL ADDRESS OF THE PRESIDENT.

I think we have good cause for congratulation on the very substantial progress we have made along all horticultural lines during the past year. Several new County Societies have been organized by men who show considerable enthusiasm in the work and I have no doubt good reports will come from them in the near future—of the older County Societies, the Wyoming County Association has arranged for the planting of a large commercial apple orchard by a company composed of some of its members, and a few Philadelphia capitalists who are engaged in selling fruit in that city. The members of the Adams county society conducted a very careful line of experiments for the suppression of San José Scale in their several orchards, and compiled an accurate report of the results. This report was considered of such importance by Secretary Critchfield of the State Department of Agriculture that he has secured a copy, which he will print in his annual report and send broadcast to the farmers of the State for their instruction.

Insect pests and fungus diseases were unusually troublesome during the past year, but our people have advanced in their knowledge and are better able to control them than ever before. The State Department has kept a large force of experts at work in the different counties of the State, giving spraying demonstrations, while the owners of proprietary mixtures have also had their agents out among the farmers instructing them and assisting them in their work. Nurserymen as a rule have complied with the terms of the fumigation law. The trees sent out have been carefully fumigated, and being clean when planted will be much more easily kept clean than unfumigated stock. Taken altogether, I think our orchards are in much better condition to-day than they were this time last year.

But a careful examination of the fruit on the table before us will bring to light the fact that we still have much to learn. That fine collection, which represents the best product of many of our most careful growers—shows on many specimens the marks of San José Scale, and sooty spot fungus, our scientific men will do well to study that fruit carefully. We have done the best we can with our present knowledge, we ask your aid in discovering more positive remedies for these troubles. One of the most promising events of the year was the passage of the Adams bill by Congress, this bill practically doubles the appropriation for Experimental Stations by the U. S. Government. This will allow our station to diversify its work, to start a series of horticultural experiments that will be of great services to the fruit growers of the State. We were all glad to learn that the Trustees of State College had secured the services of Dr.

Thomas F. Hunt, of Cornell, as Director of the Experiment Station and Dean of the School of Agriculture. He comes to his new position fully impressed with the importance of the fruit industry in Pennsylvania, and admirably equipped for the work. I ask for Dr. Hunt, the hearty support and co-operation of every member of this society.

The new German tariff law provides a maximum duty of $1.65 per bbl. on apples, and a proportionately high rate on dried apples, for all countries that do not comply with certain conditions before July 1st. A bill has passed the House and is now before the Senate which does not provide for such a treaty of commerce as would secure for us the minimum duty of 50 cents per bbl. Unless this bill is so amended as to comply with the requirements of the German Government before July 1, 1907, we will have to pay the maximum duty of $1.65 per bbl. and would simply be prohibition. This may seem a small matter to some of us who always sell our fruit in a near local market, but we must remember that large commercial orchards of York Imperial apples have recently been planted in certain sections of this State. That York Imperial apples sell at a higher rate in the German markets than in any other foreign country, consequently if we loose the German market we loose the best foreign market for Pennsylvania apples. I would suggest that the Legislative Committee take up this matter and prepare proper resolutions to be presented before the close of this meeting.

To the delegates from other societies who are with us, I extend on behalf of the society a most cordial welcome, we are glad to have you with us, we hope you will feel perfectly at home, and taken part in all the discussions. We want you to have a good time and to carry away with you only pleasant recollections.

COMMERCIAL FRUIT GROWING.

PROF. G. F. WARREN, Cornell University, Ithaca, N. Y.

Prof. Warren.—Mr. President, ladies and gentlemen:—This subject is one that I prefer to present with lantern slides. Since we do not have a lantern here, I will call attention to a few points on this subject and then take up a discussion of tillage of apple orchards.

Pennsylvania's Rank in Horticulture.—Commercial fruit growing is a good subject for an address in Pennsylvania because this state has always been the second or third in the Union in fruit production. I wonder if you realize how important a place it occupies. It is well for us to stop and take an inventory of ourselves occasionally. We have no later figures on fruit crops than the last census and there has been a great increase since then. At the time of the last census Pennsylvania ranked among the states: second in apples, third in all orchard fruit, fourth in grapes, sixth in nursery products and seventh in small fruits. The total fruit products for the census year 1899 were $10,500,000.00. It stood second in total vegetable products with a value of $16,000,000.00.

The total horticultural products, not including flowers and seeds and greenhouse products of this State were, therefore, $26,000,000.00. The present product is certainly much above these figures. Pennsylvania is, therefore, third in horticulture being exceeded by California and New York. Nearly one-fourth of all the crops of Pennsylvania are horticultural crops (22 per cent.).

In spite of scale, codling moth, scab and all the other enemies that must be controlled, I feel sure that this position will be maintained for many years. No state except New Jersey has a better situation with reference to markets. This position together with favorable soil and climate, certainly calls for an increase in fruit growing, so that just now when so many men are discouraged on account of scale and other difficulties seems to me to be the best time for entering the fruit business provided it is undertaken in a business like way.

Danger of over production.—But can we compete with the West? And is there no danger of over production? In 1850 the average value of fruit produced in the United States was 33 cents for every person. People who bought the fruit paid more, but the average value at the farm was 33 cents for every person in the United States. In 1900 the amount was $1.11 for orchard fruit and $1.74 per capita for all fruit, or four to five times as much is being spent by each member of our population as was spent 50 years ago. On the average, the amount spent per capita has increased about 30 per cent. every ten years. Can we say that this increase is now going to stop? Can we say that the American's desire for fruit has reached its limit when he buys $1.74 worth per year? (He probably pays double this when transportation and commissions are added to these farm values.)

Value of Fruit as Foods.—Fruit is usually spoken of as a luxury and is said to have little food value except as a tonic, to be taken much like peruna and apple jack, because we like it. The public is coming more and more to recognize fruit as a necessity. Fruit probably has a great value in keeping the system in condition to digest other food but fruit growers have generally underestimated the value of fruit as a direct food. It is their province to educate the public as to its food value. A pound of grapes contains as much total disgestible nutrients as a pound of potatoes. Apples contain two-thirds as much as potatoes and twice as much as squash. You can frequently buy a pound of digestible food in apples as cheaply as in potatoes. The kind of food is somewhat different, the fruits being lower in protein.

Development of Commercial Fruit Growing.—I believe that the wonderful growth in the consumption of fruit in the United States has not yet reached its limit. We have hardly begun to produce fruit as a business. A large part of our present fruit is grown by men who care for the corn crop first. These men are corn growers, not fruit growers. But there is developing a class of men who make fruit growing their business. In times past we grew fruit for the kitchen; it was primarily for home use. Our fathers planted one or two acres of apples, and set them on land least suited for growing grain or around the house where they would be handy. If the orchard produced enough for the winter's supply and for cider they were satisfied. They had no particular quarrel with the codling

moth. This gave more cider apples, and sometimes the farmer was perfectly willing to have more cider and fewer baked apples. You all remember in your boyhood days when you went to certain trees for your eating apples—and what apples they were! Better than any that grow today—because you were the boy with a boy's appetite. You selected only the best that were left after the worms and disease had taken their share. We may remember the enormous yields that some tree gave some year, but generally the trees were not held to a strict accounting. These old orchards were made up of many varieties. A variety for every day in the year was sometimes considered ideal.

A very large number of these old orchards are still in our State, in fact they are still in the majority, but they are disappearing. The sooner they are gone the better for our fruit interests. They furnish breeding places for insects and fungous pests, and when they do give the owner a crop that he has never earned they interfere with the sale of a better product.

The growing of fruit as a business, as many men are now coming to grow it and as more will do now that we are getting adjusted to the new conditions, is entirely a different proposition. Now our fruit farms are manufacturing plants—they must produce enough to pay dividends; but we are not satisfied with a profit, we want the best profit, and if there is any way of getting more profit the question is well worth considering.

The tendency is to get this greater profit by higher care in every detail, but we are not wholly adjusted to the new conditions and there continually arise discussions of easy ways and so-called "nature's ways." Many men believe that apple trees should not be pruned because this is "nature's way." But nature prunes and prunes severely. The limbs fight it out among themselves. Gradually some limbes are killed and those that persist are injured by the combat.

Then another man says that nature's way is to have sod in the orchard. Now the real natural way is to have the trees growing close together, each one trying to crowd the other out, so that the trees become like forest trees, with a bouquet of leaves at the top. One noted advocate of the sod mulch method has an orchard on the side of a hill. As the water sweeps down this hill it gives him an excess of moisture. He uses the grass to pump this excess of water out, but many farmers, seeing this easy way advertised, take it up wholly regardless of their soil conditions.

A man in the South found that he could cut all the roots from a tree before setting and get good results. Being an advertiser his method became widely known and many men in the North adopted it. Where he lives the spring comes on gradually, so that the tree can become rooted and may be fairly successful, but with us we have the "burst of spring;" suddenly a great demand is made on the roots and the tree thus treated generally fails to do as well. Practically all Experiment Station tests have condemned the method.

So we have many men of many minds as we are changing from old conditions to the commercial orchard ideas. The man who originates the fad or who actively champions it is usually successful, because his pride causes him to treat his trees so well in all other respects. Not infrequently his success is in spite of, rather than

because of, his fad. Many of these ideas are based on attempts to get back to nature's way. While we need to understand nature, yet it is largely in order to know how to improve her ways or to avoid them. Nature grows fruit for the seeds; her purpose is to produce apple seeds, and these with little pulp. But we want pulp and as little core as possible. Her way is to grow a multitude of small apples, while our desire is for a smaller number of large ones.

TILLAGE OF APPLE ORCHARDS.

In the summers of 1903 and 1904 Mr. Bues and I made an orchard survey of Wayne and Orleans counties, New York. These are two of the four lake counties in the noted apple region of Western New York. Each county produces about 4,000,000 bushels of apples in a year when there is a fair crop. Over 1,100 orchards were examined, whose total area was nearly 9,000 acres. Each orchard was examined for diseases, insects, character of soil, drainage, varieties, methods of pruning, tilling, fertilizing, spraying, etc., and the yields were obtained. The effort was to study everything that had to do with success in apple production. That is, to study the results of seventy-five years of apple growing.

When you examine only one orchard you can not tell what is the cause of success or failure, because there are so many factors that enter into the question. By examining a large number and tabulating the results it becomes possible to determine the relative importance of the many questions that are concerned with success in apple production.

We found that tillage had more influence on yield and income than any other question. Spraying was generally second in importance, but in some years it took first place.

In the township of Walworth, in Wayne county, every orchard as large as one acre was examined. Table I shows the yields of the tilled and sod orchards for the years 1902 and 1903.

TABLE I.

Average Yield in Bushels of Tilled and Untilled Orchards, Walworth Township, Wagne County, New York.

	1902.			1903.		
	Number of orchards.	Number of acres.	Average yield.	Number of orchards.	Number of acres.	Average yield.
Till 5 years or more,	42	304	301	27	293	355
Tilled most years,	59	221	275	20	80	274
Sod most years,	69	306	227	22	119	261
Sod 5 years or more,	70	295	202	24	124	268

The entire county was examined in the same way, except that only the larger orchards were taken in the remainder, usually those containing about ten acres or more. The four-year averages for the county are given in Table II. This shows that the tilled orchards averaged about 80 per cent. larger yield than the untilled. A part

of this great difference is doubtless due to other factors. The man who regularly tills his orchard is more likely to fertilize, prune and spray well. To see how much of this difference is due to tillage and how much is due to other factors another classification was made. This is shown in the second column, well-cared-for orchards. All these have received some fertilization, have been fairly well pruned, are not diseased or in bad condition from any causes. Of these well-cared-for orchards the tilled ones gave an average of 35 per cent. above the untilled. This tabulation doubtless gives too high a yield for the orchards in sod, for in making it all diseased ones were thrown out. In many cases these should have been included, for the disease frequently gets a foothold because the sod has lowered the vitality of the trees. The real difference due to sod will therefore lie between the 80 per cent. shown by the first column and the 35 per cent. shown by the second column.

TABLE II.

Yields in Bushels per acre of Tilled and Sod Apple Orchards, Wayne County, New York Four-Year Averages, 1900-1903.

	All Orchards.			Well-Cared-for Orchards.		
	Number of orchards.	Number of acres.	Average yield.	Number of orchards.	Number of acres.	Average yield.
Tilled 5 years or more,	38	329	266	27	275	271
Tilled most years,	41	293	229	26	182	245
Sod most years,	53	312	202	28	235	206
Sod 5 years or more,	71	675	148	31	242	200

A similar study was made in Orleans county. Table III, shows the five-year average yields for this county. Those that have been tilled ten years gave 86 per cent. higher yields than those that were

TABLE III.

Yields in Bushels per Acre and Income per Acre of Tilled and Sod Apple Orchards in Orleans County, New York. Five-Year Averages, 1900-1904.

	All Orchards.				Well Cared for Orchards.			
	Number of orchards.	Number of acres.	Average yield.	Average income per acre.	Number of orchards.	Number of acres.	Average yield.	Average income per acre.
Tilled 10 years or more,	18	151	327	$182	16	139	337	$189
Tilled 5 years or more,	17	142	274	138	9	79	296	148
Tilled most of 5 years,	59	507	225	113	42	341	234	121
Sod most of 5 years,	108	954	222	107	75	646	242	118
Sod 5 years or more,	35	329	204	108	23	197	258	134
Sod 10 years or more,	48	404	176	87	25	204	232	117

in sod ten years, and those tilled five years gave 34 per cent. higher yield than those in sod five years. As in Wayne county, the tilled orchards have undoubtedly fared better in general care. Neglected orchards are likely to be in sod. To eliminate other factors, another computation was made as in Wayne county. In this all neglected orchards were thrown out. This excluded about half the orchards that were regularly in sod and excluded some from all classes. These well-cared-for orchards have all received some fertilization and some spraying; none are badly damaged by lack of fertilization, spraying or drainage, or badly damaged by diseases or other causes. Of these orchards those that have been tilled ten or more years gave 45 per cent. larger yield than those that had been in sod ten or more years, and those tilled five or more years gave 15 per cent. larger yield than those in sod the same period. This tabulation gives too favorable a showing for the sod orchard, for some of the diseased ones thrown out were diseased because of the sod treatment. The real difference lies between the differences shown by the two columns.

Does it Pay to Till?—The complete report of the work is given in Cornell bulletins 226 and 229. It shows the same differences for each of the years and for each of the parts of the counties. Only the summaries are given here. These tables are not theory—they are facts. How ever we try to explain away the results, we must accept the fact that for some reason the average sod orchard in these counties gives only a little over half as much fruit as the tilled ones.

The difference in income shown by Table III, are even more striking than the differences in yields—a difference that will pay for tilling the orchard, for the loss of pasture and still have a very wide margin of profit. If there is a method of sod treatment that equals tillage we must admit that the average grower has not yet found it.

These tables do not show that every sod orchard should be tilled, but they do show that it would pay to till the average one. If a sod orchard is giving good yields, and if the trees are making sufficient growth to keep up their vitality it may be desirable to keep it in sod. A few sod orchards are as good as the average of the tilled ones, but very few indeed are among the best orchards. By the liberal use of barnyard manure an orchard may be kept in good condition without tillage. But this is usually too expensive a practice. The same results may be accomplished with much less manure if the orchard is tilled. If an orchard is in sod and is not yielding well, or if the trees are losing their vitality, even if the yield is still good, it will probably pay well to till. One of the greatest differences between tilled and sod orchards is in the length of time that the trees keep their vitality. Whatever the best method of treating an old orchard, there is no doubt about the advisability of tilling young trees.

Methods of Sod Treatment.—Of the various methods of sod treatment, pasturing with hogs or sheep gave the best results, as shown by Table IV. One reason why the results with hogs shows up so well is that many of the orchards so treated were really tilled orchards—tilled by hogs. Another reason is that hogs receive much of their food from outside of the orchards, so that there is a constant addition of plant food to the soil. We hear considerable about the so-called sod-mulch method of cutting the grass and throwing it around the trees. But there are few nature orchards in which

enough grass can be grown to furnish efficient mulch, even if the method is otherwise desirable.

TABLE IV.

Yields per Acre of Orchards Receiving Different Kinds of Sod Treatment.

	Wayne County 1902.	Orleans County, Three-Average 1902-1904.
Tilled 5 years or more,	317 bushels,	350 bushels.
Sod, hog pasture,	271 bushels,	312 bushels.
Sod, sheep pasture,	216 bushels,	308 bushels.
Sod, not pastured,	185 bushels,	217 bushels.
Sod, cattle pasture,	159 bushels,	153 bushels.

Theory of Tillage.—What I have been giving are facts. The figures are the yields actually secured by farmers. There can be no question about them. When we try to explain why these figures are as they are, we enter the field of theory. We often fail to distinguish between theory and fact. Very often we hear a man start to give his "experience" in fruit growing but spend all his time on theories. Evidently the average sod orchard in Western New York does not yield as many apples nor as valuable apples as the tilled one. This is the proved fact. Why this is the case no one can positively say.

Grass may harm the trees in one of four or more ways: 1, by exhausting the plant food; 2, by exhausting the water; 3, by unfavorably influencing the living organisms of the soil; 4, the grass roots may give off some substance that is harmful to trees.

It is probable that the injurious effects are sometimes due to one, and sometimes due to a combination of several or all of these causes. If plant-food is the chief factor, then the soil that is rich in plant-food may be able to produce an excellent crop of apples and also grow grass. So the water factor may be eliminated on some soils that naturally have too much water. Such orchards may be better if left in sod. Other orchards may be on land that is too stony for tillage or on hillsides that are too steep for tillage. By pasturing an orchard the plant-food is mostly retained and the moisture is probably less exhausted. Barnyard manure may sometimes counteract all four of the suggested ways in which grass may injure an orchard. Whether an individual orchard should be tilled or not depends on many questions. But there is little doubt but that most orchards should be tilled.

The time to till an orchard is as early as the ground is fit. If tillage is begun early and stopped early many of the undesirable effects of tillage may be lessened. At New Brunswick, N. J., last summer we measured the growth of twigs about every two weeks. Half of the growth of twigs, of trees was completed by the middle of May and four-fifths by the middle of June. The best time for tillage seems to be to begin as early as the ground is fit and stop early in July. Then seed to some cover crop or let the weeds grow. The condition of the weather and of the crop will of course have to be considered.

Some men fear that tilling too early will start the fruit buds so that they are likely to be injured by frost. Last winter we tried this at the New Jersey Station in the following manner. A peach

tree was so arranged that its roots were in a greenhouse that was growing tomatoes while its tops were outdoors in January weather. At the end of a month the top was brought into the house. It blossomed in a short time. The warming of the soil had no harmful effect on the buds.

Effect of Tillage on Quality of the Fruit.—Apples from sod orchards are frequently more highly colored than are those from tilled orchards, but are not necessarily so. Tillage may make it a little more difficult to secure good color, but there were many sod orchards that gave highly colored fruit. The trees in a tilled orchard must be pruned more openly and fertilized with less nitrogen than is given to orchards in sod.

Many farmers think that apples from sod orchards have the better flavor. If this view is correct, the difference is certainly not very great. I once made a test of the flavor by passing out a lot of Baldwin apples to a society. Each member tested two or more and recorded the number of the one that he thought best. The apples were numbered so that the members did not know which ones were from sod orchards. When I came to sum up the results there did not appear to be any decided vote in favor of either kind.

There is also a common opinion that apples from sod orchards keep better. This is probably sometimes true. The larger apples from the tilled orchards are not likely to be quite as firm, but this larger size is a desirable feature and may offset any inferiority in keeping. Apple buyers frequently discuss the question, sometimes favoring one kind of treatment and sometimes the other. But more conclusive than their discussions or than farmers' opinions are the actual prices paid. It will be seen by Table III that the tilled orchards exceed the untilled by a larger per cent. in income than in yield. That is, the average price per bushel is higher from tilled than from sod orchards.

I do not wish to convey the idea that tillage is the all important question in orcharding. It is one of a number of essentials. One-eighth of the trees in these counties were killed and one-fourth damaged by lack of drainage. Too close planting has seriously damaged large numbers of orchards. Lack of fertility has damaged others. In 1904 in Orleans county the unsprayed orchards overaged $92 per acre in income, the ones sprayed three times averaged $139 per acre. Proper packing and marketing are other vital points. The ultimate death of nearly all apple trees in New York comes from improper pruning. The decayed trunks and consequently broken trees are usually the result of the system of pruning and the neglect of wounds. All these and more are the factors that enter into successful fruit growing.

THE PRESIDENT.—I am sorry we cannot give you time to question Professor Warren just now. We are going to go through with our program, and if you have any questions to ask, we will give you an opportunity to take up the subject later.

Just now, I am going to do something not on the program. I want every one to recognize Doctor Hunt when they see him. I want you to know him, and I am going to ask him to come to the platform, and say a few words as to what our experiment station is going to do for us.

HORTICULTURE AND FORESTRY IN PENNSYLVANIA.

By DR. THOMAS F. HUNT, Director Pennsylvania Experiment Station and Dean of School of Agriculture, Pennsylvania State College.

DOCTOR HUNT.—Mr. Prresident, Ladies and Gentlemen:

Naturally, when I was invited to come to Pennsylvania as the Dean of your School of Agriculture and as Director of your Agricultural Experiment Station, I asked myself what are the large problems. The general problem is to create wealth and improve citizenship through the agency of these two institutions. How was it to be done? What are the wealth producing factors with which I must deal?

Pennsylvania, in common with the other North Atlantic States, is especially adapted to the growing of trees and grass. Pennsylvania and New York together produced in 1905 one-sixth of all the hay raised in the United States. The cultivated area in Pennsylvania devoted to all crops of all kinds except grass is less than one-fifth of the total area. About one-fourth the area in farms is in cultivated crops, other than hay, about one-fourth in hay; the rest must be in pasture or timber or be absolutely waste land. Much of the lumber area is probably under present management even prospectively unproductive, notwithstanding the fact that both the consumption and the price of lumber are increasing at the rate of 3 per cent. a year. Pennsylvania produces 1.5 tons of hay for each animal of 1,000 pounds; Illinois produces three-fourths of a ton of hay for each animal. Illinois produces 4,800 pounds of concentrates to feed with this three-fourths of a ton of roughage, while Pennsylvania produces 1,600 pounds of concentrates to feed with 1.5 tons of roughage.

Trees not only create forestry, they also create horticulture. The reason that Pennsylvania and New York are the two largest horticultural states, citrus fruits excluded, is because they are tree states. Only those who have studied the tree growth in the states, westward of Pennsylvania to the Rocky Mountains, can realize the difference in the vigor of all tree growth. In Illinois, Ben Davis apples come into bearing at five years of age. When I went to New York, I was told that Baldwin apples came into bearing at fifteen years of age and I asked how long the trees lasted. They said they did not know, that they had not been raising them long enough to find out, but that they had trees 100 years old in full bearing.

The fundamental proposition I lay down for Pennsylvania agriculture, (using the word 'agriculture' in its broadest sense), is that the State is especially adapted to the raising of trees and grass, and that all agricultural industries based upon trees and grass will flourish and should be developed. Next week I expect to say something before the State Breeders' Association about the development of the industries which are based upon grass. To-day I confine myself to the development of the industries based upon trees.

Recognizing that in Horticulture Pensylvania had an important industry requiring expert knowledge and skill, I looked around to see what agencies The Pennsylvania State College had for developing it. I found that the institution had one very worthy but underpaid Professor of Horticulture and an assistant who had been working there for twelve years for a thousand dollars a year. The numerous letters of inquiries upon horticultural subjects, which are being received constantly, have to be answered by hand. When I came to inquire into the money required to maintain the instruction and research, I found that it was so small it could scarcely be calculated. There was no adequate agency for studying the fungous diseases and insect enemies which form so large a part of the problems of the horticulturist. Less than four thousand dollars was spent for salaries and maintenance for instruction and investigation in horticulture and none at all for investigations in fungous diseases and insect enemies.

I at once prepared a budget for the Executive Committee in which I recommended the establishment of two departments of horticulture; one to deal with fruit raising and vegetable gardening, and the other with flouriculture and landscape gardening, and that a Department of Forestry be created. For these three departments the budget sets aside for salaries and maintenance $15,200.00 for the fiscal year 1907-08 and $18,700.00 for the fiscal year 1908-09.

I expect the heads of all these departments to say that this is not enough money. Already the head of one of them has served notice upon me that unless more money is forthcoming for his department than I have provided in the budget, that he will not accept re-appointment. I think he is right, but it is so much more than nothing that I had not dared to ask for more. The budget also provides for the employment of a botanist who will give his whole time to the study of fungous diseases injurious to orchard, garden and field crop, and for a Professor of Zoology and Entomology who shall give at least a part of his time to the investigation of economic insects. Coupled with the recommendations concerning the budget was a recommendation for a building for horticulture, forestry and entomology at an estimated cost of $100,000.00. This is to be a building about the size of the new Dairy Building and to have sufficient green house space for investigations in horticulture, fungous diseases, economic insects and for instruction in horticulture. If students are to be taught horticulture in this climate between October 1st and May 1st in a real, vital way, and not merely academically, then glass houses must be provided.

I should, perhaps, pause here long enough to say that all these recommendations have been most heartily endorsed by the Executive Committee of the Board of Trustees of The Pennsylvania State College.

I should also add that the lack of attention to horticulture upon the part of the Experiment Station has been due to the settled policy long ago established by the Board of Trustees to apply the limited funds of the Station to investigations in Animal Nutrition and Dairying rather than trying to spread the activities of the Station over a wider field than the funds would warrant. Conditions are now such in this State that money should be forthcoming to study the horticultural problems of the State.

In looking into the conditions of the Experiment Station, I found that its resources had been so husbanded, under the careful management of Director Armsby, that there was the sum of $7,000.00 coming from the Federal Government and known as the Adams Fund which must be expended before June 30, 1907. Of this sum, $4,200.00 had been set aside for work in Animal Nutrition. The Executive Committee has, therefore, agreed to set aside the remaining $2,800.00 to be spent upon some definite horticultural investigation before June 30, 1907, with the expectation of continuing these investigations out of the Adams Fund and other funds after that date.

Just what these investigations will be must be decided in consultation with the man who will be employed to execute these experiments. In this matter, the Dean and Director desires the counsel and advice of the State Horticultural Society. The Experiment Station desires to meet the most important needs of the horticultural industries first and leave the less pressing needs for later investigation. The Director, however, feels sure that the time has arrived when the investigations made at the Experiment Station in Centre county are not sufficient to meet the needs of the horticulturists in Erie and Lancaster counties. The Experiment Station of the future will be just as large as the State of Pennsylvania. Probably, therefore, the most important work in the beginning is to get acquainted with this State-wide Experiment Station by making a sort of reconnaissance, not for war but for peace; not for bullets and bayonets but for fruits and flowers; after which the most important problems can be studied in the most effective place and in the most effective manner.

COLD STORAGE—WHAT IT MEANS TO THE HORTICULTURIST.

By A. S. DeVOUT.

THE PRESIDENT.—We are all interested to know how to get the most dollars out of fruit, and we have invited Mr. A. S. DeVout, Manager of the Brelsford Packing & Storage Co., of this city, to talk to us a little while on Cold Storage and what it means to the horticulturist.

MR. DEVOUT.—Mr. Chairman, Ladies and Gentlemen: I feel somewhat out of place this evening, in the first place I am not a public speaker, and in the second place, after listening to the remarks of the gentleman who have preceded me, men who have had much practical experience, and closely in touch with the various branches of the business of a Horticulturist, I may properly say that I feel out of place. When your Chairman, Mr. Heister, came to our office and asked Mr. Worden, the Secretary & Treasurer of our Company, to fill this place on your program, he was after the right man, for he has had charge of the storage branch of our business

since we have rented storage. However, I have agreed to take his place and tell you something about cold storage, although what I have to say may not enlighten you as much as it should in regard to the storage of fruits. I know as much about horticulture as the hog that Professor Warren told us about in connection with the orchard. I have always looked on the hog as being good for one thing, and that is hams, bacon and lard; but I am glad to hear that it has other merits. Now as to Cold Storage. As most of the great inventions of the past century have had to pass through an experimental stage or period of existence, so has this been true of the different refrigeration systems that have been invented and tried during the past thirty years. The original method was called the absorbtion system, but it was soon discovered that while it was a sensible method, yet the compression system was the more practical, and this has almost entirely superseded the absorbtion system, except where fuel and water are cheap. The compression system with brine as a circulating medium is the one in use at our plant. About four years ago we enlarged our plant, which is really a pork-packing institution. While we had for quite a number of years taken in some outside storage as a matter of accommodation, yet it was not until this time that we made it practical in this direction, and since then we have done some outside storing. We find that apples, pears, peaches as well as berries, vegetables, oranges, lemons and other fruits, can be kept with a positive degree of success in our storage rooms. Of course you might imagine that melons and such fruit which are of a juicy character will not carry so well, also that over-ripe fruit will not keep for any length of time, although cold storage has saved thousands of dollars on account of a temporary over-stocked market, and also on account of the weather. Right here I wish to say that this should be of great advantage to horticulturists because I have noticed that most of the apples stored in our place have been for the Produce and Fruit Dealers in Harrisburg, and very little for the fruit raiser himself. In other words, the crops of the fruit raiser come in at a time when they bring the least money, and the Commission and Produce dealers buy these crops and put them in storage somewhere, and reap the benefit that is to be derived by holding them until there is a rise in the market. Now most of our storage, of course, has been in the line of butter and eggs, while that has no immediate relation to the business of the horticulturist, yet the fruit raiser is frequently a producer of butter and eggs, as well. But I see no reason why the fruit raiser should not take advantage of this opportunity to carry his fruit. It certainly is a practical method to pursue.

In our place of business, it is true, we have not carried as much fruit this last year, and the reason for this I do not know, except that we have not gone after the business. I am not here talking for business, we have a very limited space of cold storage to rent in connection with our other business, and we encourage the storing of eggs, because we put them in in the early part of the season, and they stay there all summer, which makes them the least expensive goods for us to carry, but we never turn down any man with fruit, if we have any room at all. We always have a little room for the horticulturist, so that while I am not here to solicit business, yet I feel that the fruit grower should take advantage of this opportunity

to get as much money out of his goods as other men do, if not at our plant, elsewhere. Here are men who are producing butter and eggs and have been storing for years. Why should not the fruit growers do the same thing. I want to say that you cannot make rotten fruit ripe in a cold storage house, but you can keep good solid fruit in good condition. We have some pears in our cold storage plant now, which were put in last fall in an over-ripe condition, and they are now in good condition, and Mr. Heister has stored more or less fruit with us for a number of years, and I think a great deal of it in an experimental way, and I think he would be able to tell you more in a practical way of the results obtained than I am able to do.

The temperature carried is from 32 to 38 degrees. Solid fruit held long, should be carried at a low temperature, and those for a shorter period at a higher temperature, and should warm up slowly, and have a circulation of air to dry them off. I find this is quite important in the storage of fruits. I know that we have stored quite frequently a large quantity of lemons, which is a very perishable piece of property. I have seen lemons put in cold storage, lemons that were not over-ripe, kept possibly two months with very good results, and then again I have seen them put in there in poor condition, and packed in crates, with wet mucky papers around them, and come out in very bad condition. But lemons put into storage with nice clean wrappers around them will invariably come out all right, and it seems to me that if lemons will do this, that perishable fruits, such as pears, plums and apples, ought to keep just as well. I believe that it is positively necessary when these fruits come out of this temperature to have them warm up slowly in order that the moisture should dry off before they are put on the market. I might also say that I believe it is good policy in storing fruits that they be stored in ventilated packages, and I also believe it is an advantage to store fruits in small packages rather than in large ones. This, I am satisfied, has brought about the best results.

Professor Surface, who possibly may be present, put in our rooms quite a few samples of chestnuts last fall. I think they are over there yet. I believe his object was to find out the advantages of cold storage in relation to the chestnut worm. I have not heard what his results were, but one of his deputies gave me some of the samples, and he told me in regard to the keeping quality of the chestnuts, that the results were splendid. I found that the chestnuts which had been put in a freezing room and carried at a temperature of 22 degrees Fahrenheit, were full of frost, and in fact tasteless, and of course necessarily worthless, while the chestnuts carried at a temperature of 32 degrees, and I think in another room of 38 degrees, were not only in the best of condition, but I doubt if anyone could have told them from a fresh chestnut; their flavor was elegant. I am very anxious to see how he made out in regard to the worms. He might be able to freeze them, but I am afraid that at a higher temperature he did not do much damage to the worm.

There is one thing very essential in the cold storage of fruits, and that is that the temperature be carried evenly. This can only be brought about by artificial refrigeration, there is no question about that at all. I also believe that there is only one method of artificial

refrigeration that is practical and that is brine circulation as a medium. Many of you have seen the cold storage machinery in breweries and packing houses, what is called the expansion system. I do not believe this is practical for the cold storage of fruits. I think you have Mr. McKay from Philadelphia here, and he might disagree with me on some of these points. If he speaks to you tomorrow, take his word, because he knows more about it than I do. In relation to brine circulation with this system, if you have any trouble with your machinery for a short time, you can make repairs without fear of varying the temperature, because you have a large quantity of brine in the storage tank which can be circulated and the temperature regulated by turning off or on the coils of pipe in the room. Another advantage, too, is this: That the ammonia, which is the general medium used in refrigeration is entirely separate and away from the cold storage room; it is down in the engine room, and there is nothing going through your coils but cold brine which can do no harm in case of accidental breakage.

There is one thing about Harrisburg that I might say in relation to cold storage, and that is, as to its central location. There is no reason why Harrisburg should not make an excellent distributing point for the horticulturists in this section, or other sections, and fruit shipped from other states and to other states. We are not very far from New York, and we are in close touch with Baltimore and Philadelphia, and we have the best kind of railroad facilities. I do not know why Harrisburg should not be an ideal place for the storage of fruits and their distribution, nor do I know why horticulturists should not take advantage of these opportunities in addition to the advantages he has in cold storage.

As I said before, I am not here to talk business, we have very little cold storage room to offer, but we would be glad to rent to anyone what we have. To sum the matter up, Mr. Heister wanted me to make a few remarks with reference to the advantage of cold storage. I simply say that those advantages are being used by others and that the farmers and fruit growers should have the primary use of it, and I believe that the time is coming when the horticulturist will see more advantages in the use of cold storage than at the present time. I thank you very much for your kind attention.

MONEY IN PEACH CULTURE.

By J. H. HALE.

THE PRESIDENT.—In presenting this gentleman, I would say that he does not need an introduction.

MR. HALE.—Mr. President, Ladies and Gentlemen: Please don't applaude like that. If you do that, I shall have to tell you a story. Some one has said that married men do not live longer than single men, only it seems longer. So the program as it was made up for

this evening, and my coming in at the tail end made the evening seem a little long to me. One of the disappointments or lack of pleasure of interest that came to me is this, when one is expected to say something, it takes the edge out of it somewhat, as the man whose good wife lay dying, and she was satisfied to go, and she took John by the hand and said, I am sorry to go, but I am not going to place any restrictions upon you, except one little request; at my funeral just ride in the carriage with mother. John immediately replied, Yes, Mary; yes, but it will destroy the pleasure of the day for me. So to appear here at this late hour has taken one of the pleasures of the day out of me.

The subject that has been assigned to me is a pretty broad one. Your Secretary asked me to speak on the subject of peach culture, tillage and marketing, but I won't go into all those features of it. There is so much that might be said and so far reaching in its effect, that a good deal will have to be left out for questions that may be asked hereafter. The growth of the peach in America, commercially, is a comparatively new enterprise; that is, when you take into consideration the extensive scale in which they are now grown. The old commercial peach growing was only in a few favored places in the United States, and that was in Delaware and New Jersey, and some in Michigan. At one time those places were supposed to be about the only "peach region" in America, and the season was a very short one. The marketing of peaches in New Jersey was about three or four weeks, and then they were gone; so in Michigan, they were used mostly for canning purposes, and were bought up practically for the purpose of canning, and for the purpose of a local supply, as well as in other sections of the country where they could be grown, but on the whole they were the particular sections from which they could be shipped to other places in a commercial way. Now, there is a "season" of six months or more of the peach market in America. This has come about through various reasons. One was that which Prof. Warren touched on, the increased appreciation of fruit as a food product. Fruit was once a sort of luxury, as the years have gone by. By looking up fruit growing statistics in New England, the records of the Massachusetts societies, and other societies, seem to show that the early planting by the Plymouth and Jamestown colonies in connection with the fruit were simply for the purpose of making something to drink out of their fruit. But now we know as a staple article of food, fruit has been steadily increasing in use and value, and I think the organizations which you have so largely introduced in Pennsylvania, New York and New England, known as the Grange, have had much to do with encouraging the fruit as food idea. The Goddess Pomona constantly reminding us that fruit is the one food that comes from the hand of God without any preparation or cooking, and that is something to stimulate us to a daily use of fruit. The demand for the peach as a healthy food has been one of the prime causes for its increased use six months of the year.

Another prime cause for its extensixe use is the character of advertising and the displaying of fruits, as we all observe in our foreign friends, who put on the fruit stands the very best fruit obtainable, and they make it show better than anyone else; and now, we have not only the fruit dealer, but the grocery man, in the large

cities, who are on to the job and employ special fruit men to make a fine showing of their fruit. I know in New England at many groceries, they have fruit specialists at $25 or $30 a week who make a fine display and who put out a splendid display of fruit, in order to make it more attractive, and be better able to sell it to customers, because its attractive beauty has first caught the eye.

We have been complaining of this gobbling up of small railroad lines by richer ones, yet the consolidation of railroad lines in this great country of ours has had much to do with the increased fruit consumption, for by these consolidated through railroad lines, it has been made possible to ship peaches into regions where they could not have gone before. This is also owing to the development of the refrigerator car. While it was possible in earlier days to ship peaches from the Delaware Peninsula, they did not go further than the fruit would bear shipping on slow trains in ventilated cars, but now the market may be five hundred, one thousand, or two thousand miles away, and we go there and deliver the fruit in fine order, and this is owing to the invention of the refrigerator car and the consolidating of railroad lines.

Then, the new style of packages has also had its influence in increasing the supply and distribution of fruit, because we can now ship it in crates and smaller baskets, in all sizes, which make fancy looking and lighter packages, and I would say right here that the character of our packages has also had very much to do with the increased consumption of fruit. Then, also bringing about a newer type of peach; peaches that are more hardy in their bud, and are larger bearers and more resistent to the frost in the bud, are much better, has had a great deal to do with the increased production, and we find that they are much better to ship and keep than the old Persian types we had been growing; I am speaking of the North China type now. So to-day, with the exception of Northern New England, and the Northwestern States beyond the Lakes, we grow peaches in practically every State in the Union, and I might say in almost every county. That is a little bit strong, but I can say that there is not specially a particular region where they cannot be grown to a greater or less degree of success, and it is not necessary to go off your farm or certainly not out of your township to grow peaches of one or more varieties, if you desire to grow them. And these are the reasons that we have "the peach season" six months of the year, instead of three or four weeks, as heretofore.

Now, what are the essentials to successful peach growing? It strikes me, after a life's work in the cultivation of the peach, studying the conditions of my fellow man, together with the market conditions, and all other things, that would help to stimulate peach growing, I have come to the conclusion that the best foundation for success, lies in the man or woman who has taken up the job. I find men and women succeeding in many localities, and their neighbors falling by the wayside, although the conditions are the same with both. I find that everywhere; so it seems to me, the first thing is the man. Life is pretty short and pretty sweet to most of us, and I think most of us ought to be doing something we like all the time. I don't mean to be on a jag all the time. I don't believe we should get up every morning and go out to something, that is our life work, that is distasteful to us. I believe there is something for every man

and woman to do, what they love most to do, and I believe the man or woman who grows peaches should first love the peaches for their own sake. I think the man who shoes a horse, should love to shoe him, and have him go on his journey better fitted to do the work that is intended for him to do, and that he loves the horse better than the man who just wants to drive the nails in. We sometimes forget that there are some who are just as well fitted to raise potatoes as peaches, and if he can get more for the potatoes, he had rather raise them, but we sometimes forget what our love is, the man who likes to grow peaches better than he does potatoes, will make most money with peaches.

I was visiting a friend in New York State. In the morning we drove into the railroad station—it was the day after Thanksgiving—and while standing there, a slick looking, well dressed fellow purchased his ticket, and I noticed him put some change in his pocket, and walk away, and leave his ticket there, and my friend took it over to him and handed it to him, and said, "I guess you were down spending the night with your girl, or in love, you are so forgetful." "No. I am not in love, I am married." So, I think some of us forget we are in love, but just married, and so keep on working for money rather than plums.

Almost any soil will grow a peach tree, but a light, sandy loam will not grow a too vigorous tree. If I take my choice, I would have a lighter soil for the peach tree than for any other tree fruit, providing the elevation was alright. In certain stiff clay soil the Crawford varieties will thrive, but a good loamy soil is good enough. I don't want to plant in valleys or in hollows, but I want to climb up the hill and plant my trees there. Some people talk about the eastern slope and the southern slope. I don't think it makes very much difference, if you have got enough elevation above the surrounding country so there will be good air, frost, and water drainage.

The market location is a very important point. We want to be near a market, if we want to sell at home. Of course, the market is all over America, but if we are growing them in a small way, our facilities for shipping are lessened, because shipping by express is demoralizing; so if you are not blessed with a home market, you want to engage in it large enough to be able to ship in car lots either alone or in combinations with neighbors, and you must fit yourself in your orchard, and keep yourself in touch with the local conditions that surround you.

The labor question is getting to be an important one and must be taken into consideration. The labor question in agriculture today, or in any line, is one that must be thought of very carefully. The variety we should plant is also another question, and the harvesting you must cover by considering the labor problem. It is one of the important factors of the day in ascertaining where you can get your labor at harvesting season. You might be able to harvest your fruit at a certain season of the year and have an abundance of help, while two or three weeks later or earlier, you could not obtain sufficient labor to harvest your crop. So that the selection of varieties has to be made not only in relation to markets, but to the labor question as well.

In Connecticut, where I grow them, and down in Georgia, while I

am able to get labor when I wanted it, yet two weeks earlier I could not get labor at all, for our crops come due just after the cotton culture season is over and is laid by, and they will come there just at the right time; and help us out on the peach harvest before cotton picking begins, so it is in my Connecticut orchard, for the reason that I am near the large cities and can bring from New York and Boston a certain number of Italians, who love fruit, and like to be among fruit. They are working in New York in hotels, as waiters, and get from eight to ten dollars in salaries, and about as much in "tips," and right here I want to say that I am opposed to "tips." I will pay the landlord all he asks, but I won't pay the waiter one cent. I say we are able to get Italian waiters from the better class of hotels to come to us through the peach season, because they truly love fruit and want a picnic, and they come there and camp out, and have a good time. To them it is like going to the mountains, or to the shore, only they get paid $9 a week for their fun.

On the labor question, a man wants to be informed with reference to it beforehand in the peach business, rather than afterwards, and understand what the conditions are in the locality in which he puts out his orchard. Those are some of the essentials.

Now, then, we have discussed the man, and the soil, and its elevation, and in relation to the market and the railroads, and the labor question. Another difficult question in a way, and a very serious one, is the climatic conditions, for the reason that in the northern section there is the killing of buds in a dormant condition in winter time. We can head that off to some extent by climbing the hills and planting proper varieties, and by proper cultivation. Now, south of this section there is the danger of early swelling of the buds, and early blooming, and the spring frosts after the buds open. In the north there is very little danger to the killing of the bloom and buds in blooming season. I should think that was the first and great difficulty in the way of profitable peach growing.

Another difficulty in the way of the growing of peach trees along the Blue Range and north, is the yellows, a thing we know very little about, except it is sure death when it gets in our orchards, and we have to guard against that by pulling our trees out at the first sign of this disease. Another difficulty is the monilia or brown rot, and another, the leaf curl with certain varieties, notably with the yellow ones, but since we follow spraying, it is thoroughly controlled. The borers are always with us, and may be kept out by banking the tree during the early season, while the moth is flying, and the black smut that infests our fruit, where the trees are too closely planted, and where we use too much nitrogenous matter. Lastly, the San José scale, that scared the life out of us a few years ago, but it has been a benefit in some ways, because when a man is fighting that, he is fighting a great many other things, and is weeding them out.

You can't grow peaches without culture. You can't grow them successfully and profitably without thorough culture. Just as Prof. Warren said about the man who wants to cultivatte his orchard in corn; he is a man who should go out of the peach business, and go to raising corn. Just like a man in Massachusetts who planted a few hundred trees and left them grow up in grass, as he said he

would make sure of a hay crop anyway. I said to him, "Your orchard has gone to grass sure." Cultivate your peach orchard just as early as possible the very first thing in the spring. Let it be April and May and well into June. If you don't seed to a cover crop then let it go to weeds, but don't let it go until June or even the middle of July. I repeat, cultivate early and cut it up thoroughly and often, but late in season. Let it grow up to grass and weeds, rather than cultivate too late.

The pruning question is an important one along with the necessity for spraying. We must have low headed trees. Some gentleman was telling here to-day—I thought he was stretching it a little bit—about his trees being higher than the ceiling of this hall, but he was talking about apple trees. We want low headed peach trees. In planting I cut the stems down to eight or ten inches, and build up my tree, and prune with the general object in view of having a broad low headed tree. Just how to do that, each one must study it out for himself. You can't tell how to trim a peach tree any more than you can tell about hugging a girl. Just do the proper thing at the right time, the peach will show you how by her blushes.

A MEMBER.—How will you cultivate them if they are low down?

MR. HALE.—Take a mule or two, and then take two spring tooth harrows, divide them and put a wooden spreader between them and let one of them go up close to the trees and while you and the horses are going merrily down between the middle of the rows of trees, the harrows will be doing their work. Clear up under the low heads.

The question is often asked, why do you get such good fruit from two or three thousand miles away? Because they have to grow, pick and pack them properly in order to get them to market. We want these low headed trees, because we want to get to the tree and spray, prune, thin and pick the fruit more easily, because in such cases we can come up to the tree and do all the work without the use of long ladders that add 60 to 80 per cent. to the labor cost.

I repeat that we must spray the trees. The Lord and the San José scale—I don't know whether they are in partnership, but the pest has brought about a benefit in more ways than one. When we are annoyed with them we must spray our trees, or our trees will die. The "Bugologists" have been telling us for the last twenty-five years that we should spray, but we did not believe them, and now the San José scale says we must, and therefore we have gone to work in the spraying of our fruit trees, to get rid of this pest, and in doing so, we also aid the tree in various ways, for the lime and sulphur spray mixture, best for destroying scale, is also a superb fungicide, a preventive of monilia and leaf curl, smuts and sooty fungus.

Another point about which I wish to say a word, is the necessity of thinning the tree of surplus fruit, in order, by taking off all the imperfect specimens, and more, if necessary, that we can raise a big crop of more perfect fruit. The thinning of the fruit is essential, first, in order to get a larger peach, and secondly, in order to get a better colored peach, and thirdly, to get a better flavored peach. So a tree that would naturally bear, perhaps, a thousand peaches, should be thinned down to four hundred, the four hundred will bring

more pounds than the thousand, and will bring you, perhaps, double, or treble the amount in money, as it is the large, high colored, fine flavored peaches that pay best.

In my market I have graded my fruit into three grades, and we market it in one-half bushel or Jersey baskets. A one-half bushel basket of number ones has about one hundred to one hundred and ten peaches in them, and sell for say about one dollar, and a one-half bushel basket which would have sixty or seventy extra sized peaches in it would sell for one dollar and a half, so that is Bryan's sixteen to one (taking it backwards, while the smaller sizes from unthinned trees, may run 175 to 225 per basket, and be slow sale at 50 cents per basket.

As to the manner of pruning of those trees. I get a good strong one year tree, and chop it off at the top, at time of planting and plant it out and cut it back to about eight or ten or twelve inches, according to my wish, or convenience, and when it starts to grow it will start out sprouts all along the tree from the base up, and those you should rub off, except three or four or possibly five nearest the top; let those three to five grow at will until the following season, and before the growth begins, do your pruning first by cutting out entirely one or perhaps two of these remaining stems that may be out of place, then cut off from one-half to two-thirds of the growth of those that remain, and then perhaps thin out some of the little side branches from there. They will start to grow again and each one of these will make a strong growth, and in the second year you will treat it much the same way as you did the first. The third year, instead of doing as you did the former years, if you want peaches, do a little summer pruning. Cut out the inside branches; don't cut anything outside, but from the centre. Cut out so you have an even distribution of the branches, and cut off the tops of the leading main branches. The third summer will usually throw those trees into developing a big lot of fruit buds that will bear a crop of peaches. You will likely get a good crop the fourth year.

By my pruning methods I have perhaps the worst looking orchards in America, but am lead to believe I have the greatest amount of money out of them of any one in the country, and I assure you I have a great deal of pleasure out of them also.

Now, after having suggested some of the general methods of producing a fine crop of fruit, I am not going into details of the culture and general methods of orchard handling, because I have not the time. I find that fruit well grown under the best methods of culture and care, needs careful picking when it is ripe, not when it is green or overripe, but when it comes full grown and colored, and that is the time you need to pick. You should pick over your trees from four to six times to get the fruit in its most perfect ripe condition. At the first picking you may not get more than a dozen specimens from a tree. The next time not so much more, and the third picking you will get much more, and then at your fourth picking they will begin to drop, but it takes from twelve to eighteen days to get all the fruit off of anyone tree. Then, further, you want to assort your peaches. I believe you have a sorting machine through this State, and they are the invention of the Devil. I don't mean these men, who invent and sell them are Devils but it is the spirit of the Devil

that would attempt to assort beautiful delicate peaches with a machine of any kind, and hope to preserve their beauty.

A MEMBER.—Do your Italians know what kind of fruit to pick.

MR. HALE.—I wish I knew one-half as much about fruit as those Italians from the North of Italy. In that section of Italy they have been reared among fruit for a thousand years, and they know how to handle a peach just as a mother knows how to handle a baby; just at the right time and right place.

Another important factor in the handling of fruit is, that it wants to be packed carefully, and as tight as you can get it, and honestly packed from top to bottom, so that there is no difference in the character of the fruit all the way through. Each and every package if it is a Georgia carrier, the lower tier of basket should be so full that the tray will fit firmly down on the fruit, the upper tier of baskets should be so full that the cover when nailed on, will bring a full pressure down on the fruit. Where you use a climax basket with a cover, have the basket so full that there is a strong pressure on the fruit. In New England we use a special colored red netting entirely, simply to hold the fruit in its place, and keep those who handle it on its way to market from stealing it. But honest packing and honest assorting will pay more than anything else. I think that is the one great essential, and after you have done that, every basket of peaches should be labeled with the name of the shipper, and his post office address, and any other statement of fact and taffy you want to give your customers that will aid them to know and appreciate your fruit. After it is packed honestly you are entitled to toot your own horn all you want.

It pays to advertise horticultural and orchard products as well as other lines of business. Every farmer should be an advertiser of his products. There is no reason why he should not do so, any more than the man in other business. I think every farm should be named. I go through Harrisburg, or Philadelphia, or through any of your prosperous towns of Pennsylvania, and see manufacturing establishments in full blast, and see a great sign somewhere in connection with the operations of the plant telling me who owns it, and what they are manufacturing, and in that way we know where to get the manufactured articles. I reiterate, it is just as profitable business to put out a sign at the farm, and on our packages proclaiming to the world your business, and who you are. If you are doing a good business, it will bring others there, and if you are not, it will turn them away. It looks as if the farmers were ashamed of their business in not advertising in some way their products. Put up a little blackboard at the farm, and state on it who owns it, and what that farm sells then chalk up from day to day or week by week, just what you may have for sale at that particular time. If you have a good peach crop, and are to sell in home market, you should advertise in the local press that you are doing business, and what you have, and do it legitimately and well. If you sell to retail dealers, it is necessary to advertise, either by letter or a personal call so they can come to your orchard and see what you have, and also write them to come when your orchard is in full bloom, and they will see that it is clean, and will produce clean fruit. I say get them out, if you have to pay their railroad fare; bring them out when it is

bearing, and show them how you pack your fruit, and show them every detail of your business, because you want to get them in sympathy with you and your fruit, and then they will make their customers give you about twenty-five per cent. more for that fruit, because they are in touch with it and know it is the best of its kind. If you are dealing on a large scale, and wish to deal with a man who buys on a large scale, whether he is living in New York, Cleveland, Chicago or Baltimore, say to him, "Come down here and see the orchard, and see what I am doing; how I am doing it;" and if he don't come, some other man will; that is, some man who wants your account will come; if they come there and see your goods they will keep in touch with you, and you will get the confidence of those men, and you will come in sympathy with each other. And there is big profit in faith and confidence.

Some people don't pack their fruit quite as carefully as they ought and ship to some one whom they never saw, but their neighbors say he is a good man, and gets a moderate return, and another replies, that fellow cheated me, and the result is he does not get what they are worth, but if the commission man knows you and knows your goods are always all right you will get good dividends out of them It is not right to build up a good orchard and lose our profits out of them, because we have not been able to get our fruit to the right men in the right market. The most profitable markets in Pennsylvania, and all other states, are the local markets; of course, they may not be a large factor for everyone, but the little orchards all over this country wholly supply in their season all the market peaches that heretofore were supplied by Delaware or New Jersey, but it matters not how many come to the different places they cannot compete with the home grown peaches delivered to the families fresh from the orchards each morning. They will always have first call there, and there is a saving in freight charges, and a saving of the commission. If you do a little business and come in contact with the consumer, the retailer's as well as the wholesalers profits is cut out, and everything is to the good. I know that time and time again people have produced fine fruit, and shipped it away, and paid the railroad charges and commission, and it might have been sold at their home market for more money than they received by shipping them away. Pennsylvania is an enormously rich State, and people in Pennsylvania are making money, and they want home grown fruit, and the home markets are worth more than any other. Don't forget the home market and the home supply.

Now, as to Pennsylvania's opportunities: A gentleman told us about those splendid apple orchards up in western New York, and we have heard about the wonderful fruit producing orchards in the West, but I say now that no State in the Union has so much fruit growing territory as Pennsylvania. In western New York they stick apple trees into that rich soil and they grow to great size, but your hilly lands of Pennsylvania are worth ten times as much as the western New York districts are. I want to say that those orchards up there are going off the face of the earth when Pennsylvania gets on to its job and plants them on the hills, just as they are doing along the Hudson, and as we are doing in New England, and the latter orchards will put the others out of business, if the scale has not already got such a hold of them as will finish the job.

I spoke about cultivating the far away markets and sometimes in neglecting the near ones at home. I have suffered from doing it, and I am drifting more to the home market as a safe and sure friend that it pays to stick to. In the rush of harvest in Georgia we bring in some six or eight hundred colored laborers, and put them in camps and huts there, and have a day watchman, and a night watchman. They sometimes get into trouble, and when in trouble, we bring them up before the local farm court—sometimes I am judge, and sometimes I am prosecuting attorney and my Superintendent the judge—and we settle them right there, so as to keep them out of the city and town courts, because if they get there, they will give the offender pretty hard treatment; or if he is a scalawag we always turn him over to the proper authorities and they usually put him in the chain gang, or on the roads. Evidently many of you don't expect to get into jail. How you expect to escape with the many temptations in Harrisburg, I don't know. One Saturday night our watchman discovered some colored gamblers who came over from Savannah, and we arrested three, and sent them into town, and the fourth one we arrested, and we did not know whether he was a genuine gambler, or not, but we tried him before our own farm court —I was judge on that occasion—and one old darky began to edge his way up to the front, and took off his cap as he saluted me, and he said "'Scuse me, Cap'n, you is Jedge, an' a very just Jedge," (giving me a little taffy; he is the real thing when it comes to taffy); he says "Jedge, you ain't goin' thar right way to get the truth out of these men; I'm a little older than you; 'scuse me for interference", and I said "No interference at all"; he said "I have experienced you askin' these niggers who is in the game and who gets the money; my experience in life is this: The nigger that wins never knows nothin'; you have got to get the truth out of the nigger that loses." How like us poor white trash when we are on easy street we don't squeal, but just as soon as we begin to lose in the game, we tell the truth. So I want to tell you out of experience of being pinched in distant markets that your local markets are the best, if you want to get the best net money out of your fruit.

Pennsylvania has greater opportunities than any of the eastern states that I know of. I never ride through your State and look out at the rolling hills, but what I feel that I would like to get a few hundred thousand acres of those hills into orchards. Don't fear the south-west. Two years ago it cost me sixty-four thousand dollars for railroad transportation alone to get my Georgia peaches into the market. Now the lands I have had my eyes on, from what I can see in traveling on the railroads, are your beautiful rolling hills in grass. You also have a lot of chestnut ridges, and they are the next to take up with a view to making them useful in this direction. In the last three or four years I have taken up three or four hundred acres of land where there were chestnut sprouts grown up and it was covered with rocks and stumps. When it came to assessing the lands the men who owned them held up their right hands and swore they were not worth more than three dollars an acre, and when I wanted to buy them, they wanted twenty dollars an acre. I have bought such lands prices varying from ten to thirty dollars an acre, and cut down the trees, small brush and undergrowth and planted them in peaches. At another location I picked on a hill

that I wanted for apple trees, and I had this growth cut off in midsummer, and in the fall set fire to it, burning nearly clean without any piling, and surveyed off the rows thirty-six feet apart each way, and whether the place for a tree went on a stump or rock, we dug the holes, and about sixty per cent. of those holes were dug with dynamite to blow out the stumps and rocks so as to get the tree right where I wanted it. When this planting was going on, an Italian who had been with me eight or ten years, said, "Why not plant peach trees," and I said, "Peaches must be tilled; peaches want tillage better than apples and this land is too rough to till," and he replied, "This best peach land, no better land around than this for the peach, give you a finer tree; you want to plant this land with peach." I said to him, "It can't be done; it is too rough; it can't be tilled." In a day or two he came back again and tried to hammer it into me; he said, "I think more about peach; I tell you I work for you nine years; now I like to go in business for myself; you think no peach grow there; you make me a partner there, and I make the peach grow like hell." Now, Lewis's "hell" is really like heaven; he is one of those fellows who makes things grow, and my Secretary, when he went out said to me, "Mr. Hale, what are you going to do about that; whatever you are going to do, you had better be doing it, Lewis knows what good peach land is," and I made a contract with Louie to quit working on a salary, and move up there on the hill. Of course it took more dynamite, and he planted peach trees eighteen by eighteen between the apples which were thirty-six by thirty-six feet. Lewis's idea was to break up the ground pretty thoroughly and grub around those trees. Those trees were planted in better dug holes than most holes are dug in America for that purpose. He shook out all the grass roots, stones and trash of every kind, and made it fine and mellow as for fine seeds, and set the trees. We used there a moderate amount of fertilizer, and made a good start in the Spring, and he grubbed around the tree, so that there was a place about six feet in diameter thoroughly worked up around those trees and he hoed them over several times and they made a good growth that first Summer. I had across the way another orchard that I started the year before where the land had been cleared, most all stumps and stones got out at an expense of over one hundred dollars an acre, and well plowed, and as I went away I told Lewis, here is culture on the one side, and here is your grub method on the other. I went away in June, and came back in a couple of months, and found Lewis had a couple of Italian friends who had come from Italy, and he made a contract with those fellows to grub it over, the entire ground between the trees in one section of his orchard, and where he dug all over, they were growing there better than in the plowed land that it had cost $100 per acre to clean, and he said "Mr. Hale, you want to grub hoe the whole business;" I said, "You said you were going to grub around the trees," and he said, "I did not tell you how much I was going to grub," and I concluded it would cost about three thousand dollars to grub that whole orchard, but they grew so much better, possibly it might pay to do it. The rocks and stones are as thick almost as your heads are here in this hall. Now the conditions would be almost as easy to plow in that land as it would be plow between your heads which I see before me. There were rocks weighing from two hundred to four hun-

dred pounds each and hardly room to pass between them but the trees grew so much better after the all over grub tillage that we decided that that land must be tilled, so we went in there with eight or ten horses and twelve men, and began to get out those stumps and rocks, and we were able to break it up at a cost of not only this great labor, but at the expense of smashing many plows. I called Louis attention to the fact that I paid two hundred dollars on his broken plows, and he said, "So much the better; the man that make plows, and don't sell them, don't buy any peaches." Even where we had not yet been able to plow the trees are growing beautifully. It is grubbed better than you or I could do it, as the Italian men will grub land away down deep, and give it a thorough grubbing and shaking up, and in a circle of eight feet in diameter. These trees however don't begin to grow as fast as we broke the plows, and the plow man is now buying peaches. I am getting a splendid orchard, and it will soon repay me all the money, and the people who eat that fruit will pay the bills. I am just paying out the money now, and expect a return from fruit buyers hereafter.

(Confusion in rear of the Hall).

So there is a rat going across the floor back there. I think if I have talked so that the rats are coming after me it is time to quit. I have told you about this rough orchard matter so as to inform you of what is going on in other sections of the country. I have another large orchard yet, and in which I am going to do the same thing. The time is passing away and I should quit, and I have not said but very few things that I meant to say about the general subject of peach culture, for the use of eighty millions of people, we find the production of the past not sufficient, and they want more; they want them delivered in greater quantity, in better style and over a larger season. The old style and size packages won't go any more, but the American market is hungry for good peaches, and the American pocket book is full of money for good peaches, and if you don't grow them, somebody else will.

THE PRESIDENT.—It was suggested that a committee be appointed to see the Governor and ask his pleasure about coming to our meeting, and on motion of Prof. Surface, the Chair was authorized to name such committee. I will appoint a committee and notify the gentlemen to-morrow morning. If there is no further business, we will taken a recess until to-morrow morning at 9 o'clock.

Adjourned.

MORNING SESSION, JANUARY 17, 1907.

THE PRESIDENT.—Owing to the fact that one of our speakers has an engagement at 10 o'clock we are obliged to transpose our programme.

I will call upon Hon. William T. Creasy, of Catawissa, first, on the subject of "Apple Growing."

MR. CREASY.—Perhaps I owe the convention an apology for not giving more attention to the subject, in writing it up. The reason is that my time has been given up to matters pertaining to legislation and to other associations in which I am interested and take part.

In the Garden of Eden and down to the present time, the apple has been an important factor in civilization. No medicine has been equal to give health to those who eat thereof; no cosmetic can color the cheek of the maiden or artist paint such rosy tints as are produced to those who partake of this fruit.

The apple is king of fruits. It furnishes from one summer's end to another the most delicious and healthful foods and being the fruit of wisdom is used and appreciated by the nations of the highest civilization. When in bloom its fragrance and variegated tints present to the lover of nature a grand conception of the handiwork of the Almighty.

From the planting of the scion to the maturing of the tree, the culture affords the orchardist an enjoyable vocation. It initiates him into the mysteries of nature and teaches him reverence and adoration for a higher power.

Fruit growing, speaking in general, is humanizing, tending as it does to elevate the emotions and develop the finer sensibilities in mankind. But, you may ask, does this philosophizing pay us? Our more modern ideas have dropped the esthetical side of the proposition and adopted that of the practical. In other words his aim is the shekel rather than the beautiful and his inquiry is, does it pay? So I suppose you want me to discuss the commercial rather than the esthetical sides of the subject of apple growing.

The subject of location is probably one of the first things to consider, together with the value of the land. The orchard should be located close to the farm buildings so as to permit of pasturage. The apple adapts itself to many kinds of soil but where there is a hard pan it is useless to plant trees for as a rule they prove to be slow growers in such soil, after a certain age and also poor bearers. No amount of fertilizing will make up for a soil underlaid by an impervious hard pan. A northern exposure is preferable but an eastern will do. A southern exposure is not desirable.

Another reason why the orchard should be near the farm buildings is that it will be more convenient to store the crop which is getting to be a very important matter to consider.

As stated before the apple is not so particular as to the soil in which it is planted but a very warm soil is not at all desirable for winter apples, as it makes them mature too early. Early maturity is also sometimes brought on by too heavy fertilization with manures rich in nitrogen. Apples cannot be grown in soil that is not well drained.

The orchard should be cultivated until it arrives at the bearing age, which will vary some according to varieties. But I would say that it should be cultivated for the first ten years after planting. If this is not possible, however, good results can be obtained by mulching your trees with coarse manure or other available material.

Weeds and grass must be kept down by mowing for thus disposed of they make an excellent mulch. The cropping of an orchard is a practice not to be recommended, at any time unless it is the first few years after planting. After the orchard begins to bear nothing will be of better service than to allow the hogs to have free range in it. They will destroy all wormy apples and if fed well will manure the orchard. With this plan in force little attention is required except to see that the weeds and grass are kept down.

I am satisfied by actual experience that when orchards are pastured it is not necessary to spray for the codling moth. The orchardist will find it to his interest to keep a sharp watch on the outside trees, however, as they are the ones to be most troubled by this moth. By picking off the wormy apples on those trees in time, which may be done at odd hours, a crop of apples can be grown almost entirely free of wormy ones. As a protection from mice, rabbits, etc., we place a piece of sheet iron or other suitable material around the trunk of the tree to any height that may be desirable, say ten inches or one foot.

Raw bone, potash and stable manure are the best fertilizers for the apple, but they should be applied during the growing season. Labor and fertilizing must be reduced to a minimum because both are costly and that is why I am a strong advocate of pasturing orchards. I have a Baldwin orchard treated by this plan that produces as fine apples as are grown anywhere.

The orchardist is liable to make two fatal mistakes in planting trees. One is planting too many varieties and the other planting more trees than he can look after. Because after all success depends on quality more than quantity.

The fruit requires attention in every detail. If you sell direct to the consumer he expects a uniform quality and likely the same variety year after year. If I were to plant an orchard of 500 trees I would put in 499 Baldwins and one Northern Spy which I would top graft with a Baldwin.

In the selection of varieties one should be guided by the locality and the markets in which he sells. I find that the Fallawater which sells readily in our home markets is not at all saleable in other markets. Then again some varieties of apples produce more perfect specimens than others. That is to say you can pick more marketable apples of some varieties than others. This is one of the good traits of the Baldwin as compared with many other varieties. Color is also an important factor. The apple should not be picked until well colored, but it dare not get too ripe. The application of potash to orchards helps the coloring. Apples can also be colored after picking if put in slats, crates, or on small piles and exposed to the wind and some sunshine for a few days.

The subjects of pruning, harvesting, storing and selling are important, but I will leave them for others to discuss. In closing I wish to say that the future looks brighter for the apple grower who will give attention to his business for with the formidable army of insects attacking the orchards, the worst of which is the San José scale, the careless grower will be put out of business together with his inferior fruit.

THE PRESIDENT.—This subject has been divided up into several heads. We had hoped to go over the whole subject and then have a discussion. As Mr. Creasy, is obliged to leave in a few minutes opportunity is now given, if anyone desires it, to ask any questions at this time. Are there any remarks?

MR. LESHER.—I would like to ask a few questions. Mr. Creasy has stated that he had a Baldwin orchard and cultivated it for a number of years. I would like to ask him if there is any difference

in the color of the Baldwin apple when cultivated and when not cultivated. That is, do they mature earlier when cultivated or mature earlier when not cultivated. The second question that I would like to ask him is, what proportion of the Baldwin apples are used for cider apples.

MR. CREASY.—In reply to the last question I would say that the Baldwin apple gives us few cider apples. They run pretty much the same size and we have very few that are wormy. We have only cultivated our Baldwin orchard a few years. We alternated it with peaches and farmed it the first year with potatoes and after that put nothing in it, but we cultivated the orchard while the peaches were growing and had some enormous crops for a few years, but I don't think I would do that again; I think I simply would plant it with apples. If you cannot cultivate the land on account of rocks and stumps I would phosphate it. The apples on our Baldwin orchards, that we have not farmed for a number of years, seem to ripen very nicely; in my estimation they ripen a little earlier than those that are cultivated, as a rule. While the specimens are very fine on the cultivated trees, and far above the average size, yet they drop a great deal more.

MR. LESHER.—You commence to pick about what season of the year?

MR. CREASY.—Whenever they begin to color. We have commenced the latter part of September in some years and some years in October. October is our month but it depends altogether on the color because it is important that they be colored.

DR. GUMP.—I don't wish to take exceptions to anything that the gentleman has said, but the honorable gentleman makes a mistake when he says if he planted an orchard of 499 trees he would plant them all Baldwin and the one Northern Spy and graft that to a Baldwin. That is too general. Twenty-five years experience in Southern Pennsylvania has taught me that the Baldwin apple is not a success with us. It is too far south. That is one reason why I think the gentleman makes a mistake when he advises the planting of Baldwin's entirely. That same advice was given me when I planted my orchard 25 years ago, by a gentleman who said if I planted an orchard of 500 trees, I should plant 499 Baldwin trees, and I said, what other variety would you plant? He said, I would make it a Baldwin. I did so, and, gentlemen, had I planted my 500 York Imperials instead of Baldwins, I would be worth $10,000 more to-day. My Baldwin trees are large thrifty but they havn't given me 500 bushels a year to put in cold storage. They have given me apples but they fall too soon. If you pick them, as the honorable gentleman says, before they are ripe, I fear they would not be saleable, if you pick them when they are ripe they don't keep well. If you put them in a cold storage house cooled with ice, in our section, at a temperature of 32 to 34, they will speck for you; there appear little black specks on them. So I want to speak of this to show that the suggestion made by the gentleman is too far reaching for all of us. It is all right for Northern Pennsylvania and New York and even there, the Baldwin apple does not compare with ours so far as the quality and color are concerned. My Baldwin trees are a great deal larger than others, but I have a row of York Imperials 36 feet

from the Baldwins and they bring a great deal better results. This is practical experience.

A MEMBER.—Do you take care of the orchard yourself?

DR. GUMP.—I look after it and help to see that it is done right. As to the cultivation I thing he is perfectly right, and there is no doubt that to cultivate every year makes them too tender and they fall too soon. That is the best evidence that it is not best to cultivate them too often after they are 14 or 15 years old.

MR. CREASY.—After you live in a locality and determine what are the best varieties to plant, by observing the various varieties in that locality, your experience will teach you your market and what variety will best succeed. On my farm I plant Baldwins because I think it is the best variety for that locality. I do not wish to convey the impression that if I lived somewhere else I would plant Baldwins for I might not do it. With the kind of soil I have on my farm, I am confident that I will succeed best in growing Baldwin apples, and therefor I plant Baldwins. However, I don't say that, that would be the best variety to plant in some locality. Perhaps if I were living in some other locality I might plant York Imperials. You must find out by experience what is the best variety for your locality and your market. I am glad the Doctor spoke about this.

MR. ATKINSON.—I would like to help the gentleman from Southern Pennsylvania because I was induced to plant a great many Baldwins too and found they would not answer for me. I am in Montgomery county, which is about the same latitude as Harrisburg, and I found the Baldwins would not do for winter apples. I expected to grow them and keep them through the winter and found I could not do that. So I picked my Baldwins in September and put them on the market immediately, and I think, if the gentleman down in Pennsylvania will pick his Baldwins the latter part of August and put them in nice shape in barrels, and send them to the Philadelphia market he will get a good price for them, and perhaps, will get as much out of them as he does out of his York Imperials, and he will get more out of them by shipping them to the Philadelphia market than Mr. Creasy will get out of his while he is walking around watching his Baldwins grow red, because I don't think he will get any more for them, at the time he speaks of picking them, than he would earlier in the fall.

THE PRESIDENT.—Mr. Creasy is about to leave the room and we will take up another phase of this subject.

VARIETIES.

By PROF. GEO. C. BUTZ

PROF. BUTZ.—I don't know of any other subject that is more difficult to talk on than this subject of varieties of fruits and yet, I am appealed to almost every day by persons writing to State College to know what variety they ought to plant, and sometimes they will

even ask what varieties they ought to plant out in other States. I don't know why they think we should know such things because it is one of the difficult things we have to deal with. As has been stated here it is largely a question of locality, of market, of soil and as to what the man wants to grow for, and very frequently the question comes before us as one of those difficult questions and is one of the least interesting problems that comes before us at an experiment station. Having gone over the State of Pennsylvania, I have been impressed with the fact that one particular variety is just the thing to grow and if we should know where they are best grown it would be worth a whole lot to us. I find in the bulletins some information on the varieties suitable for certain counties, but I think you will agree with me it is not an exhaustive study, and it is almost impossible to say what variety is best to be grown in any particular section. However, we find in the northern part of the State that the Baldwin and Northern Spy, perhaps the Baldwin more than the Spy, are counted on as being the best varieties for that section. Out in the western part of the State the Rome Beauty seems to be one of the best varieties. Down in the southern part of the State the York Impérial stands head and shoulder over all, and in the eastern part of the State they are in doubt as to what is best to tie to. So that in one county it is this variety and in another county it is that variety. Therefore, I say, it is not a very satisfactory thing to attempt to tell another man what varieties he ought to plant. We have also a number of varieties that are succeeding in other places, which are trying to find their way into Pennsylvania and some of these ought to be planted in an experimental way in the different sections of the State in order to determine their value.

Since hearing Dr. Funk speak of the Staman Winesap apple, and tasting some of the excellent fruit he had here yesterday I am very much impressed with that fruit, and think it ought to be planted in the south-eastern and southern part of this State. I usually tell persons who inquire with reference to the variety to plant, that it is necessary for them to examine the soil and select the varieties which is more or less known in the market where they handle their fruit, and to select an apple of medium size because it is more profitable than a large apple. Also to select an apple that is red in color and one that resists fungus diseases. I don't know any variety that is better with respect to this, than the York Imperial and I believe it will succeed in more counties than any other variety.

When I am asked in regard to the best variety as to quality I usually say the Baldwin, but in that the Baldwin is now suffering from that spot and they are less interested in the Baldwin because of that increasing condition of the Baldwin variety.

It would pay us in starting new to have our trees budded or top grafted by taking the Scions from a resistant tree. So I say we seem to know in a little way what varieties are best to be planted. Our knowledge of that is something like the man that Joseph Jefferson tells us about who seemed to know something on every subject, and inviting some friends to his place, and after supper they sat on his porch and talking about different subjects Joseph Jefferson said to Mr. Jones, you are well informed, now tell us why one apple tree across the fence there, has no fruit on it, and the other is loaded with them, and Mr. Jones went over and dug down and took a piece of bark off the roots and showed where it had some substance on it

and said, that is the fungo mortem and when that occurs on the roots of a tree it cannot bear fruit but he did not take into account that the man was here yesterday and took the apples off that tree. I believe with Mr. Creasy who finds that the Baldwin is the best to be grown in his locality that, that is the apple which should be grown there and that in New York State where they find the Rome Beauty is a fine bearer and is of fine quality, that, that is the apple that should be planted there.

THE PRESIDENT.—This is a very important question and if we could only localize the varieties of fruit, where they could do the best, it would be a splendid achievement. We will take a little time in the discussion of varieties best to be planted in the different parts of the State.

MR. BARNETT.—I would like to ask the Professor whether he has any knowledge of an apple called the Highfelt apple; it is the best keeper and hardiest apple in the State?

PROF. BUTZ.—I don't know anything about it.

MR. BROWN.—They were sent here by Frank Vanderaux, of Delaware, and I don't know anything about them and did not know they were here until I took them out of the box. Dr. Funk seemed to be very well acquainted with them.

THE PRESIDENT.—Evidently that is a Delaware apple.

MR. ATKINSON.—How widely is the Smith Cider apple distributed over the State? In Montgomery and Bucks' counties it is the leading and only apple planted for the general market.

PROF. BUTZ.—That is another question hard to answer. How widely they are distributed I could not tell but in some sections they are without color and almost green so that it cannot be compared with a more colored apple. We had some Smith Cider apples at State College and they have almost disappeared because they were not very thrifty.

MR. ELDEN.—Do you think it would be proper to plant Grimes Golden in southern Pennsylvania?

PROF. BUTZ.—I think so. I believe that if it were more generally planted it would prove a more exceptional apple in a colder section than grown to-day. It is winning favor in the western end of the State, especially in the gravelly soils. In some sections the charge against it, that it does not bear heavily enough to be a profitable apple, but that is a question again of soil, exposure and locality.

A MEMBER.—It is almost too early here for a winter apple; it drops badly.

PROF. BUTZ.—Taking the eastern counties, running up as far, and including Bucks county, and down along the southern border counties of the State which have pretty nearly uniform conditions in which certain varieties will succeed and others will not, and I think in your section it is just about the lower lines of counties in the State of Pennsylvania. When we reach the mountainous sec-

tions they are more like our central Pennsylvania sections. Perhaps for you the Grimes' Golden would not be as satisfactory as some other varieties, and as satisfactory as they are in some other sections.

MR. ATKINSON.—The Williams Early Red is one of the finest apples in our county for the Philadelphia market and I have been thinking that it might be a very fine apple in the southern counties for the same market.

THE PRESIDENT.—What is its time of ripening in comparison to the Red Astrachan.

A MEMBER.—Just about the same time. It is a very dark red apple there are a very few stripes on it. It is large with rather a tough skin, is a good shipper, and will bring considerable more in the Philadelphia market on account of its color, than the Red Astrachan. Generally most of my Williams are marketed from the ground and we pick them as they color and send them to the Philadelphia market but when there comes a high wind they fall and we gather and market them, and they bring a good price. They will always average, I think, a dollar a bushel in the Philadelphia market including those gathered from the ground, and I think if those people living along the southern tier of counties in this State would cultivate that apple they would find it very profitable. It is an apple the Italians take to very naturally. You will find them on the fruit stands in Philadelphia.

MR. BARTON.—There is more money made on the Williams apple than any other. It was shipped last fall to New York and supplied the steamer trade and brought one dollar and seventy-five to $2.25 and most of those apples were picked from the ground. We consider it the best paying apple among us.

MR. ATKINSON.—I have seen them sold in the Philadelphia market, in five-eighth baskets for $1.00 a basket; that is, for nice specimens.

MR. BROWN.—There is another characteristic of the Williams Red, and that is you can get it over in three pickings, which is a great advantage over the Red Astrachan. It seems to me that people here should take up the question of growing early apples. From my home station we shipped 225 refrigerator cars of early apples; most of those passed through Harrisburg over the Allegheny mountains. You are 200 miles nearer the markets than I am. While I am talking this way perhaps I am talking against my interests but nevertheless I am willing to advise you as to the best varieties of apples to be planted in different seasons. There is a great deal more money in early apples than in late apples and the Williams is one of the four varieties that is grown as an early apple. On our place we have to get them off in about a month. We begin marketing them about the 30th of June and on the 28th of July we are through with them.

PROF. BUTZ.—I am very glad that the subject of early varieties came up. Speaking of the length of time they can be picked makes it a superior apple in that respect. In this connection I wish to

speak of the Jeffries apple which may be picked from the 1st of August and you may have apples on the tree until the last of September. It always reminds me of the highly colored lithographs of fruit. This fruit is tender and juicy and suits anybody whether he likes sweet or sour apples. It seems to me it would be the fruit that should go to California and have tissue paper wrapped around it. If a man is in the market where he could handle that fruit I think it would be very profitable fruit for him.

PROF. WARREN.—One point I think is worth considering: Nurserymen do not like to grow it because it is difficult to get the tree and I believe it is best to buy hardy stock and graft it on the stock. That is, buy something else and top it.

MR. ATKINSON.—It is rather better to top work it on a good strong growing stock. I endorse what Brother Butz says in regard to the Jeffries apple, but when it comes to be compared to the Williams as a commercial apple it is not in it at all.

MR. OWEN.—I would like to know whether anyone knows anything about the Nixonberg Apple; it is not registered in the nurseries. It is a dark red apple and of an excellent flavor and grows down in the southern part of the State. It is a good keeper.

PROF. BUTZ.—I think it is rather a local apple. It is found in Greene county where they have no railroads and where they have things of their own, which people do not have in the rest of the world. I don't know the apple from any experience.

SPRAYING AND THINNING.

By H. C. SNAVELY, Lebanon, Pa.

THE PRESIDENT.—Mr Snavely is not here. He has sent his paper which will be read by Mr. Lefevre.

After chosing a soil adapted for the best development of tree and fruit, relating varieties adapted to the particular locality and bestowing the best cultural attention, in the way of feeding and tillage; there yet remains the most important phase of successful fruit growing in general and apple growing in particular.

With the advent and increase of insect, pests and fungous diseases it has become impossible to maintain a vigorous and healthy tree, or to secure sound and attractive fruit, without a well considered and well directed plan of combatting insects and fungi.

The spraying outfit is indispensible with the up-to-date fruit grower. Before the appearance of the scale insects, it was possible to have live trees, though stripped of the foilage by the caterpillar or canker worm, and the fruit tunneled and furrowed by the coddling worm or gnarled and knotty by the work of the curculio or scabbed and rusty, ready to take an untimely leave and return to mother earth, saving the trouble and expense of thinning or pick-

ing, altogether an object lesson of ignorance, negligence and thriftlessness.

Since the scale insects cause the destruction of the trees, whoever wants to have live trees must resort to spraying, and whoever wants healthy trees and good fruit must also spray.

Spraying spells fighting, but the work must be well directed. This necessary part of orchard work is too disagreeable and too expensive to go about aimlessly.

One should know when to spray, how to spray and with what to spray for best results.

Sufficient literature is at the command of every one. The experiment stations all over the country have issued bulletins dealing with every phase of combatting fungi and insects that infest fruit trees. Our own State has furnished instruction not only through bulletins but has sent demonstrators all over the State to show the people how to do the work. Whoever loses trees or has poor fruit for want of combatting orchard pests at this late day deserves no better.

While we have not wholly passed the experimental stage of spraying, enough is known, and at the command of every one, to enable the wide-awake to save his trees and to have good fruit.

Spraying has resolved itself into a business proposition.—Does it pay?

Spraying is the price we must pay for fruit. Can you buy cheaper than raise it? That depends upon the man with the nozzle. Like in other activities some succeed and others fail.

I sometimes think the scale insects have come to us like a blessing in disguise. It has put lazy men and trees producing worthless fruit out of business, clearing the way for the intelligent and thrifty. It is the old story if the survival of the fittest.

There are those who wait for parasites to clean out the scale. To my mind unless the spraying is set in motion, the scale will do the clearing long before the parasites are due. The parasites will come, but the wise man will not sit down and whine, but he will hustle and fight and hold the field until the parasite reserves arrive.

What did we do with the potato beetle, we fought and fought for years, we raised potatoes, finer and better year after year, our warfare on the bettle was a success, and what do we behold, the parasite has come to relieve the sprayer.

But the sprayer is needed in the potato field as much as ever to combat the blights. So in the horticultural field, if the scale should disappear in a year the sprayer would continue to be a necessary adjunct.

Coming to the thinning of fruit there are several things and conditions precedent. On tall trees the work can not be done expeditiously or profitably. Trees should be trained to form low heads. Open, low headed and wide spreading trees are the only kind the progressive fruit grower can have. In planting keep this in view from the start, and if you have skyscrapers reduce the height to within a reasonable reach. By so doing one will be in a better condition to spray thoroughly, to thin the fruit and to gather it.

Some varieties seem to be persistent biennial bearers. This is

largely due to overbearing in the fruit year. All the vitality of the tree is required to carry out the fruit and the trees fail to make buds for the succeeding year. Hence the so-called "off year." It seems that this condition can be changed by restricting the tree to moderate fruiting. I know this is a mooted proposition, but unless we have positive proof the contrary it seems worthy of trial. I also know that other conditions such as feeding and tillage will enter into this question. As in the matter spraying so in the matter of thinning fruit, it resolves itself into a business proposition. Will it pay? This depends on different things, but the principal one depends on the owner of the trees.

Choice fruit costs a good deal to produce, and for this, one must have a market calling for something extra, or the grower will be a loser. Choice fruit, if placed in attractive packages is always in demand. There is always room at the top, it is the bottom that is crowded.

Within the limits of this paper I could not refer to fomulas or to work in detail. My purpose was to point out the necessity and importance of combatting fungi and insect by means of spraying, and the feasibility of growing moderate quantities of first class fruit by thinning, that will command the highest price and prove remunerative to the grower.

GATHERING AND MARKETING.

By D. M. WERTZ, Quincy, Pa.

MR. WERTZ.—The fact of the matter is I think I would rather work than talk. You may not believe this, because possibly it still is not true. I urged the Secretary that it was a waste of paper to put my name on the programme and ask me to talk about something that I knew so little about. So it is not my fault that I am making a few remarks to you to-day. The subject has been gone into so very thoroughly that I don't think of anything very serious or anything that would be additional to what has been already said.

There are several things, however, with reference to the gathering and marketing of fruit, one of which is that we should gather the apples when they have reached the highest degree of color, size and keeping quality.

Considerable has been said in regard to the Baldwin in the southern section of the State from which I come. That variety was not a success until we realized that we left them hang too long on the tree and by gathering them a little earlier we were able to save the crop and at the same time they did not suffer from loss of quality by so doing. The same would apply to the winter varieties. I never marketed but several commercial crops of apples in my life, consisting of York Imperial, Grimes' Golden and Ben Davis. Last year the York Imperial was very heavily set and the fruit

dropped exceedingly. When they did this I saw that not only the efforts of that year but of all the previous years were dropping out of my hands, and I felt very much discouraged. In the face of this discouragement I concluded to gather them on piles in the orchard. In a short time a buyer came into the orchard and told me that I had gathered my York Imperial apples too early, that I should have left them hang longer, and yet if I had done so I likely would have lost the entire crop.

With my other varieties I find the same difficulty arises. It is very important to reduce the waste and loss to a minimum. In regard to that loss and waste, especially those apples that fall for us, more particularly in the commercial orchards, I believe apple growing like many other things is turning towards commercial lines. I think it is decidedly so with fruit growing, that the orchards will become larger and there will be less of them and unless we are equipped to take care of the by-products the percentage of profit will be less, while they should be greater to the commercial grower just as in the petroleum or meat packing industry. While there is practically no profit in the main line of goods, there is in the by-products. So the question arises with reference to our fallen fruit and how best to handle it, whether it should be used by an evaporator, cider press or manufactured into a jelly product. It seems to me it is a subject that we should consider seriously and act upon intelligently.

I feel from my limited experience that I ought not to advise one way or another with reference to picking apples and putting them on piles under trees, which I did last year because I was not able to barrel them immediately. We picked the York Imperial in that way and they improved very much in color in the piles, but at the same time many of them sun scalded and there was considerable rot and decay, and on account of additional handling which resulted in additional expense I feel that under all the circumstances it was a mistake. I should have barreled them at once when picking. There may be points in favor of and against the principle but it seems to me it is best to have a barrelling table in the orchard and as the apples are picked in the bag or basket they should be emptied on the table and at once sorted and barrelled for market.

Another important question is with reference to the handling of apples. I find a great many of us do not handle them as carefully as we should; we handle them as if they were stones or potatoes, while we should be more careful. We all know we can work with a poisonous liquid, and if we have no sores on our hands we will not be affected but if we do have a sore, there is great danger of blood poisoning. I look at the apple in the same way; that the skin should not be broken so that the germs cannot enter and make trouble later on.

Then after we have arranged about the barrelling, I feel that another important question is getting them into cold storage as quickly as possible. It seems, by the way of comparison, that we should pick fruit very much as we handle fresh meat, and we know of the desirability of cooling fresh meat as soon after the animal is killed as possible, and the same way with our fruit, the sooner it can be gotten into cold storage the better it will be.

Now with reference to marketing apples, it depends very much on

the size of the crop and the kind of market the fruit grower has, or expects to supply. If he has a small crop it seems to me better to supply the local demands because it will require an orchard of considerable size until it would pay to erect a cold storage plant for his personal use.

MR. HALE.—What about the neighbors co-operating in the erection of a cold storage plant?

MR. WERTZ.—That might be the thing to do under certain conditions. The principle of co-operation is the coming principle, whether it be in railroads or any business line, and if the details could be worked out on a co-operative plan, and a plant erected, it might work out all right and be of great benefit. However, for farmers, on general principles, to erect a cold storage plant of their own, I think they should consider it very carefully, or decide what market they are going to ship to and put them in the commercial cold storage houses in that city.

Cold storage is getting to be a scientific question of the day; it is a matter of not only the low temperature but even temperature and dry temperature, that possibly, we, as individuals, back on the orchards or on the farm might not be able to control.

I don't know of anything more I can say on this subject this morning. I thank for your courtesy.

THE PRESIDENT.—Mr. Hale, we would be very glad to have you open this discussion.

MR. HALE.—I think it is pretty well open already. I don't think there is anything more to be said only I would like to emphasize what I said before; that was, and it is a point Mr. Wertz did not touch on, this picking of apples when they are ready to pick and not all at one time. If we should grow tomatoes for the market or the family supply, when they begin to color we all know we go and pick the first ripe tomatoe, and we don't let them go on there until they are all ripe and decay in order to pick them at one time. No, we go there day by day and gather them as they mature. We also go day by day and pick our cantelopes and gather them as they mature, and sometimes we do that at different times in the same day, with both melons and cantelopes, because some are ripe in the afternoon that are not ripe in the forenoon. But the apples, the best of our fruits, we mostly let the first that mature go, and gather them when the last matures. We must gather our apples when they mature, even if it means one, two, three, four or five pickings. We must do it and the people who buy them must pay for the job. I know that this will strike some of you with wonder and amazement.

We must have the tree down low so as to reduce the cost of the thinning. These are not new ideas but business ideas, and as Mr. Wertz said, it looks to me as though the orchard proposition of America, that is, supplying these eighty millions of people with fruit, will drift into the hands of fewer people because those fewer people will see the necessity of taking up these subjects and treating them properly because it will pay, while the smaller planter will say, if it means two or three sprayings a year and means the

thinning of the fruit and two or three pickings, I am down and out. As a matter of fact you have to put those additional things on it or you will go bankrupt in the way of growing your apples. If you grow apples for your family supply do it the old way, but the markets will say, stay at home with your fruit. I have seen on the Boston market over two dollars a bushel paid for apples that were grown by our competitors three thousand miles away, and they paid enormous rates, but they could afford to pay the freight on the apples. They followed the pruning methods; they followed the thinning methods, and the spraying methods, not once or twice, but a dozen of times. I have known apples over there that have been sprayed three or four times. Each individual apple had to be perfect and they wipe off every one, but that takes time, work and expense. Who pays for it? Those men who buy them in Harrisburg and other places. Those are the kind of apples that pay. I saw over in your freight station yesterday apples all covered with smut and they are not the kind that will pay but will give a fellow the fits.

The hour of adjournment being at hand, the chair requested that further discussion of the subject be discontinued for the present. The treasurer read his annual statement which was, on motion, referred to an auditing committee.

EDWIN W. THOMAS, TREAS., TO THE STATE HORTICULTURAL ASSOCIATION OF PENNSYLVANIA.

Dr. Receipts Since Last Audit.

Cash balance, 1st mo., 17th, 1906, ...	$85 15	
Annual dues for 1906, collected at Gettysburg meet, ...	54 00	
Annual dues for 1906, received since Gettysburg meet, ...	23 00	
Annual dues for 1907, received in advance, ..	4 00	
Gabriel Heister, life membership, ...	10 00	
Ehrman B. Mitchell, life membership, ...	10 00	
Edward A. Woods, life membership, ...	10 00	
Donations, ...	100 00	
Total Receipts, ...		$296 15

Cr. By Amount Paid Out.

To Prof. R. L. Watts, ...	$34 30
To H. W. Collingwood, ...	19 05
To Prof. M. B. Waite, ...	9 50
To Prof. Wm. A. Taylor, ...	7 15

To Gabriel Heister,	8 25
To Jerry Martin, janitor of Gettysburg Court House,	6 00
To Enos B. Engle, salary and expenses,	99 38
Balance, cash on hand,	112 52
	$296 15

We the undersigned auditors have examined the above account and found the same correct.

Attest:

CHESTER J. TYSON.
DR. I. H. MAYER.

January 17, 1907.

THE PRESIDENT.—We have two topics that must be held over until this afternoon. The first business after dinner will be the report of the Nominating Committee. Before we adjourn I wish to remind the audience that any person who wishes to join is welcome. We will be glad to have you. The Treasurer is going away this afternoon and he will be glad to see you at this time, if you desire to become members.

On motion, the hour of adjournment was fixed at 12:30 instead of 12 o'clock.

Prof. Surface, of committee to wait upon Governor Stuart and invite him to our meeting, reported having had an interview with the Governor, but that he was exceedingly busy at this time and was unable to come to the Hall. He stated, however, that he would be glad to meet the members personally after adjournment or at such time as may be mutually agreed upon. It was decided that the matter be further considered during the afternoon session.

The following paper was read by the Secretary:

CHESTNUT CULTURE IN PENNSYLVANIA.

By C. K. SOBER, Lewisburg, Pa.

The importance of the nut-growing industry in the United States is attracting more and more attention each year and the chestnut is gradually finding its place among the valuable nuts. In 1896 I began the experiment with cultivated chestnuts. With me chestnut cultivation is no longer a theory. On the hillsides of the beautiful Irish valley, near Shamokin, I have more than three hundred acres of young Paragon chestnut trees, nearly one hundred thousand of which have already been grafted. The Paragon has proven to be the best nut for cultivation. The nuts sell readily at from $5.00 to $8.00 per bushel, although it is thought that the prices will decrease as the supply becomes larger. It is claimed that even at $2.50 per bushel, the crop will pay better than wheat. An acre of land will grow twenty-five bushels of wheat in a year if properly cultivated. A like area of chestnut trees will produce many times

as many bushels of equally nutritious food yearly, for an indefinite period, and require no outlay for cultivation, planting or fertilization. More than this, the chestnut is generally not much affected by spring frosts, beating rains, and summer droughts, which are a constant menace to a wheat crop. Why then do we allow southern Europe to exact a large tribute from us annually for the nuts we import?

Two methods of chestnut culture are offered. The Chestnut Grove and the Chestnut Orchard. The grove is possibly only where there is a forest of native chestnut trees. The native trees are cut down during the winter and the young sprouts which arise during the next year are, when one or two years old, grafted with scions from cultivated nuts. The grafts made a rapid growth because of the established root system of the sprouts upon which they are grafted. When seedling chestnuts are grafted in the nursery, and afterward set out in rows, usually in cultivated land, the resulting growth is called an orchard. Sometimes the chestnuts are planted in hills, twenty-five or thirty feet apart. The young seedlings are allowed to remain in the hills and when three or four years old grafted. This, of course, produces an orchard, and the fact that the young trees do not need to be transplanted, is a decided advantage.

In the grove there is less liability of failure in obtaining a full stand of trees, the loss attendant upon transplanting being eliminated. Often the grove may be started on a hillside which would be worthless for any other purpose. It is not necessary that the growth of native trees be pure. If one tree in three is a chestnut, no more are necessary.

Having selected the area for the grove, work may begin at once, but preferably during the fall and winter months. All trees in the proposed grove should be cut down and the brush burned, leaving the ground as clean as possible. Frequently the lumber removed will more than pay for the clearing. If the selected ground is already waste land, it may be ready for grafting the following spring, or it may be necessary to clean the ground, removing the brush and rubbish by burning. If there is a chance to select the location of the grove, it should be located where it may easily be protected from forest fires. It is desirable to make fire lanes at once, before beginning the grafting. Fire is the worst enemy of the chestnut grove, but by keeping the ground clean, it may be controlled.

Having cleared the ground during the winter, it is necessary to wait one year for the chestnut sprouts to grow before they are ready for grafting. The following spring, which is the second after clearing the ground, the grafting should begin. The sprouts which come from the lowest portion of the stump will become independent trees before those which arise higher up, and, therefore, should be selected. At least two such sprouts, or more, according to circumstances, should be grafted on every stump, and on opposite sides if possible. Both may remain for several years, and if one is found to be superior to the other, the poorer one may be used to furnish scions. The sprouts which are not grafted should be allowed to remain for a few seasons to protect the young grafts from the wind and frost. When the grafts are one year old they should be cut back in order to get a good top. The growth during the first year is usually fan-shaped and will not make the best-shaped tree.

On the original scion only one or two buds are left, and these grow with surprising rapidity during the first year. When only one bud is left on a graft, it will sometimes make the enormous growth of nine feet without a single branch. This growth is made possible by the established roots of the old stump. In cutting back such a sprout, from three to five buds should be left. This will insure a low crown, which is as desirable in chestnuts as in peaches. In cutting back the young grafts, another supply of scions is furnished. In exposed portions of the grove, the young sprouts are protected from the wind by allowing the undergrowth to remain when clearing the land for the grove. After two or three years, the grafts are firmly established, and then everything is cleared away. By keeping the grove clean, the harvesting is facilitated, and there is less danger from fire, and the insect pests can be fought with greater ease.

It is doubtful, as yet, whether the growing of chestnuts in "orchards" will pay. Grafted seedlings may be purchased at from fifty cents to one dollar each, and with proper care in transplanting most of them should live. Chestnut "groves" certainly will pay. The call for nuts is at present large and the demand still growing, especially in the Middle West. Prejudice and ignorance are among the factors which keep many from attempting the cultivation of the nut. The American people will soon learn the value of chestnuts, and then the demand for them will increase. We are just learning how to prepare and use the chestnut as food.

In Europe the cultivated chestnut is an important food product, and in Italy, France, Spain and Turkey, it serves as one of the chief articles of food to the peasants, who long ago learned how to prepare it. In recent years much interest has been manifested relative to the commercial value of chestnuts, and there has been a steady increase in the demand for large nuts. These find ready sale, and this fact has encouraged the cultivation of various European and Japanese varieties by horticulturists.

Intense interest is being aroused in Paragon chestnuts and there is a great demand for young trees, so great has been the call for them that I have started a nursery and young trees can scarcely be grown fast enough to supply the demand. In one lot I have 10,000 seedlings, two years old, another plot of ground contains 20,000 seedlings one year old. This last season, 1906, 208 bushels of nuts were buried for planting in spring. The 208 bushels ought to produce 250,000 trees at least.

The demand for the nuts is far greater than the supply. This last year about 1,000 bushels were harvested and this amount would not begin to supply the demand. One carload was shipped to Seattle, at $5.00 per bushel, F. O. B., at Paxinos, and order after order was turned down because the crop had been sold.

One order was booked in December 1906, for 500 bushels, of this years (1907) crop, to be shipped to Seattle, Washington, and several other letters of inquiry have been received from all parts of the United States for chestnuts for this year's delivery.

THE PRESIDENT.—Are there any remarks on this paper?

PROF. SURFACE.—I think something should be said on the subject of chestnut culture, and feel it my duty to say it, and should I shirk from this duty I do not feel that I would be doing right.

Chestnut culture was tried as long as thirty years ago in Lancaster county, near Marietta, by Mr. Engle's father and other parties, and is still conducted there by a gentleman in this room. In the growth of the chestnut the greatest difficulty is to control the pest that is injuring the nut. Owing to this it cannot be called profitable. If we could control that pest, with the great yield and easy cultivation, it would be of great profit to the grower, but because of this I would not advise anyone to spend very much money at this time in commercial chestnut growing, or be misled by the glowing accounts given of prospective profits. We have a man here who is thoroughly able to discuss this subject and I want to know whether I am right or not. Am I not right, Mr. Reist, in stating that owing to the loss by "worms" it is not very profitable at the present time to grow the chestnut?

MR. REIST.—(Dr. I. H. Mayer in the chair.) I agree with you in that statement.

PROF. SURFACE.—I could say more at this time on the subject but the time is limited.

MR. HALE.—May I ask a question: You refer to the troubles of the weevil?

PROF. SURFACE.—Yes, sir.

MR. HALE.—Do you find it with all types?

PROF. SURFACE.—Yes, sir; they are all infested.

A MEMBER.—Will spraying fail in their extermination?

PROF. SURFACE.—We know of no spraying or anything else, that has fully succeeded in their extermination. At present there is no known way of treating this pest successfully. It is hoped, however, that we will be able, by further research, to meet it in time.

THE PRESIDENT.—That is what we have our Economic Zoologist for, and we believe the time will come when he will be able to ascertain a remedy that will exterminate this pest and thus give encouragement in this kind of fruit culture.

PROF. SURFACE.—In regard to cold storage experiments for chestnuts I should report at this time that we placed three packages of chestnuts in cold storage on Nov. 15th. One of these with a temperature of 28 degrees, another at 30 degrees and another at 32 degrees. The two at the lowest temperature were so badly frozen as to be spoiled. Those at the temperature of 32 degrees came through the winter in good condition, and at this time (January) the worms or weevils are dead. I believe that cold storage of about 36 or 38 degrees could be made to keep chestnuts in good condition and prevent the work of the worms, or perhaps even kill all of them. In all of them the worms were killed and there was no danger of cutting through the shells or showing up when put on the market. They were put in the cold storage in the middle of November and taken out in the early part of January.

Adjourned.

Afternoon Session, 2 P. M.

Having called the meeting to order, the President asked for report of committee on nominations, who submitted the following list of officers for 1907:

President—Gabriel Hiester, Harrisburg.

Vice Presidents—Hon. W. T. Creasy, Catawissa; F. H. Fassett, Meshoppen; R. M. Elden, Aspers.

Recording Secretary—Enos B. Engle, Waynesboro.

Corresponding Secretary—Wm. P. Brinton, Christiana.

Treasurer—Edwin W. Thomas, King of Prussia.

The aforesaid were duly elected by ballot.

THE PROBLEM OF THE SMALL ORCHARDIST.

By J. D. HERR, Millersville, Pa.

Classified in respect to the object in view fruit growers are of two kinds. He who grows his product primarily for the general market and is spoken of as the large grower or commercial orchardist, and he who desires his product primarily for home use, disposing of any surplus he may have in the local markets, and who can with equal propriety be designated the domestic or small orchardist.

As Pennsylvania has fewer very large commercial orchards than many other states, ranking below her in fruit growing, so she has a large number of small orchards, the premises without fruit trees being exceedingly rare, and in the aggregate the small orchardist is an important factor in ranking the State third in fruit growing with an annual product worth $10,000,000.

As the object of the small grower is peculiar, so are his conditions and methods. He is, as a rule, the diversified farmer or the suburban resident, and his time and energy are mainly occupied with other crops and interests. He feels he can not afford to give his best thoughts and most careful attention to fruit trees. Indeed his usual method is to set out an indifferent variety of trees in a lot chosen because of its proximity to the farm buildings or because it is too poor to grow any other crop. No attention is given the orchard until it has reached bearing age, when once a year at the ripening of the fruit the crop is harvested or rather such remnant as insects and fungi have not destroyed. Allow me to say in defense of this system, that it enables the small orchardist to grow a liberal supply of an indifferent grade of fruit for family use at the minimum of expense and was good enough in its day, but like the proverbial dog it has "had its day," and it is but truth to say and I say it with some regret that the time when fruit worthy the name can be grown by such methods has passed by forever.

This condition of things is brought about by the recent invasion of injurious insects and fungous diseases, the most important of which is of course the San José scale insect which is destroying

orchards by the thousands and threatening to put the small grower out of business. Some are bravely and intelligently fighting the pests, but many are discouraged with the outlook and have surrendered unconditionally to the enemy, allowing their trees to die or cutting them down without expectation of replacing them, and it will be only a matter of a few years time when, unless householders take hope, thousands of premises will be without a single fruit tree or ornamental bush.

Thus the small grower is face to face with a most serious problem. Failing to grow his own fruit, how will he secure a supply for himself and family? Buy it you say. That is indeed the only alternative, but it is not a perfect solution. Fruit, as an article of diet, is an absolute necessity to the maintenance of good health. It regulates the body, cools the blood, tones up the system, and is a direct preventive of fevers. When it must be bought it will be considered as a luxury and consequently will not be supplied to the average family with necessary liberality.

The only solution of this problem lies, I hold, in the application by the small grower, of modern scientific methods of orchard practice whereby he can maintain his end of the business and grow better fruit and more fruit with fewer trees at very little, if any, additional expense.

In the hope that a recital of the chief points of the cardinal operations of orchard practice in so far as they apply to the small grower, will add to the numerous successes already attained, thanks to the campaign of education conducted for the past few years by the Economic Zoologist, Prof. Surface, I submit the following suggestions:

Since Pomologists agree there are special adaptations of fruit to soils it is but wise to follow their direction for the small grower as well as for his big brother, the commercial orchardist. Briefly stated the rule of adaption is heavy soil for Pome fruit, (apple, pear, quince); light soils for Stone fruits, (peach, plum, cherry, apricot). Of course some of our fruits are very cosmopolitan, as the apple, for example, which can be more or less successfully grown on a large variety of soils, but it still remains that none of them are indifferent to even slight variations in land and whenever there is any choice within the narrow limits of the small orchardist, he should avail himself of the advantage by planting most largely of the varieties best adapted to his soil. When there is no choice then fruits can be made to grow on soils which are uncongenial to them by working them upon adaptive stock. Thus the plum may thrive upon sandy soil when it is budded upon the peach and the pear is sometimes grown on light soils by working it upon the mountain ash. No varieties as a rule should be planted but such as are known to do well in the immediate neighborhood.

In choosing a site or location for a new orchard reference should be had to elevation and exposure, very high hill lands or very low bottom lands are alike unfavorable because of their exposure to the regions of the weather in the one case, and the danger of buds and blossoms to the killing effects of frosts in the other. The choice location being land somewhat elevated above its surroundings and gently sloping toward the north and west, thus insuring both soil

and atmospheric drainage as well as retardation of bloom in the spring.

In up to date practice cultivation and fertilization go hand in hand in the production of any crop and are absolutely essential in growing a crop of fruit which is a crop after all the same as wheat or corn or potatoes, and being such it makes the same demands upon the soil.

The benefits of tillage are manifold, the most important of which are: Improving the soil and thus presenting greater feeding surface to the roots, by increasing the depth of the soil, by warming and drying the soil in spring, by reducing the extremes of temperature and moisture, and conserving the moisture by increasing the water holding capacity of the soil and by checking evaporation.

As the tree on account of the enormous leaf surface exhales more moisture than any other crop occupying the same space, the importance of saving the moisture in the soil will be admitted.

It is also demonstrated that the depletion of the land by fruit trees is more serious than by annual crops from the fact that plant foods are locked up for many years in the trunks and branches of the tree whilst a large part of the fertilizing constituents in common crops returns to the soil each year. The orchard requires, if fruitful, plant food equal to value greater than that of wheat. No thrifty farmer would think of trying to raise wheat even on our best lands for 20 consecutive years, though the soil were fitted in the best possible manner yearly, and yet this is the common practice with small fruit growers. Careful treatment in this respect would stir up the dry bones in many an old and unproductive orchard and place it upon a paying basis.

A definite amount of pruning is also advisable. While there is often a conflict of authorities, suffice it to say that trees should be headed low to facilitate picking of fruit and spraying, interfering and other superfluous limbs cut out; and when, for any reason, the tree suffers from injury, it should be cut back to the extent of the injury. By this means all varieties of fruit trees of all ages (except old apple) can be restored as long as they are not absolutely killed.

The one remaining operation is that of spraying, but recently developed, it has become the sina qua non of fruit growing, the only means of salvation to our orchards and insurance for our fruit.

For our present purpose we may speak of spraying as of two kinds, viz: Spraying for the San José scale during the dormant season, and spraying for chewing insects and fungi during the growing season. The lime sulphur wash (1 lb. lime, 1 lb. sulphur to 3 gal. water, boiled 45 minutes); whale oil soap solution (2 lb. to 1 gal. water), and certain soluble oils can be depended upon to control the scale insects.

Paris Green or London Purple are good antidotes for chewing insects including the codling moth, used in the proportion of one pound to 200 gallons water, adding a pound or two of lime.

Bordeaux Mixture is our standard fungicide, made after formula 4 to 6 lbs. copper sulphate, 6 lbs lime and 60 gal. water. The arsenical poison can be added to the bordeaux spray, thus serving two ends with one operation.

A more or less close observance of these suggestions I submit as

pointing the way out of our present difficulties for the small orchardist. This is at least no time to be discouraged. I have, myself, met with many examples of successful fruit growing in the counties of Lancaster and Berks during the last year, and we shall not lose our orchards if we apply the same good judgment and intelligence to fruit growing we aim to employ in all general farm operations.

PEACH AND PLUM ROT, AND HOW TO CONTROL IT.

By L. G. YOUNGS, North East, Pa.

MR. YOUNGS.—Mr. President, Ladies and Gentlemen: With your, and the Association's permission, I will take my place on the floor instead of going on the platform. I am a little bit cross-eyed in my hearing, and consequently I will talk down here where I can hear you. Also because I am a little lengthy for this world and I don't think I would add anything to my paper if I were to take my place on the platform.

Your Secretary has given me some idea of your troubles and while I am not able to diagnose your case, perhaps your case and mine have run on parallel lines and my suggestions may be of some little help to you. This is all I ask for and it is all I can hope or pray for.

I have come at the request of your Secretary to tell you something of the methods we pursue to control peach and plum rot over in the region of Lake Erie. Now my observation leads me to believe that most trees come from the nurseries comparatively free from spores of Monilla or fruit rot. If this is the case it behooves us growers to keep them in this condition, if we can.

This world of ours swarms with organisms of higher or lower order. The modern surgeon sterilizes his instruments. By this antiseptic method he is better able to prevent rather than cure disease. What carbolic acid and chloride of lime are to the surgeon and doctor, sulphate and carbonate of copper are to the modern fruit grower.

Now we commence operations in our orchards by first removing the mummies from the trees. This can be done easiest after a rain with a padded mallet or stick. We do it usually in the fall or winter. We are now ready for our spring campaign of spraying, which we commence before the buds are materially swollen by spraying our trees with a strong bordeaux, 25 to 30 lbs. of copper sulphate to two hundred gallons of water. We use a ground lime at this time called Cream of Lime. This is largely used to make the solution adhere to the trees and as it dries we are enabled to see how thoroughly we have covered the limbs and bodies of the trees. We do not use lime at this time to render the spray harmless to vegetation, because there is nothing to injure. We are thorough with this spraying. This is the important spraying. If we can thoroughly sterilize the trees at this time we have laid the foundation for

a successful crop of fruit so far as is in our power and on this hangs the law and all the prophets. All our orchards are sprayed at this time: Plum, peach, cherry, apple and quince. Also our gooseberry, currants and last but not least our grapes are sprayed about this time and usually in the order named. This spraying renders the peach practically immune from leaf-curl and the gooseberry largely immune from milldew.

Shortly after the trees are done blossoming we spray them again. This time using a modified Bordeaux with the Ferro-Cyanide, (Yellow Prussiate of potash), test and using for European plums, 8 lbs, vitrol to the hundred gallons with ten to twelve lbs. lime, and six lbs. arsenate of lead. For peach and Japan plums we use two to three lbs. vitrol, eight to ten lbs. lime and four to six lbs. arsenate of lead. Should rains be frequent we repeat this in a week or ten days with three to four lbs. of arsenate of lead instead of six. After this you will probably find it necessary to use a dilute vitrol water; sulphate of copper one or two pounds, water one hundred gallons, or you can use the Ammoniacal solution of copper carbonate.

We use the weak vitrol water on most all fruits at this time. The danger in using lime is the coloring of the fruits. If you have done your duty up to this time you will not have any considerable amount of rot develop during the ripening of your fruits and this weak vitrol water will keep your orchards healthy.

We use Spraymotor Nozzles. We have found them satisfactory, make a fog or mist and they do not clog when used in connection with our strainer or separator. We use six to twelve nozzles in combination. We use the Spraymotor cut off valve. We are not cranks on this and are not interested in the sale of them, directly or indirectly, or are any of our friends interested in a spray nozzle, but in our business we find it one of the best nozzles we can use.

(Exhibits spraying apparatus). In order to start properly in the spring we want to make it as easy as we can. These are the Spraymotor nozzles we use. We like them because they throw a fine spray and don't wear out very readily. I mean by that, that the hole does not get large and thus make them useless. I want to use a dense spray. This is the smallest cluster and we use them up to a sixteen cluster. Then we want a cut off. The ordinary cut off is this kind (holding it up). And we said some things that came very near to being profanity in the use of that. We have men depending on our expedition at that time and we could not stop it leaking and it drenched those men and therefore is not satisfactory so we have discarded it and come to this (holding up the object). This is the cut off we use now. There is no drip from it. There may be a drip from the cluster, but we have an inverted cup on the rod under the cluster of nozzles, and whenever there is any drip from these clusters it runs out here and drops down and don't drop down on our men. We find it is a good thing. We have tried all kinds of nozzles and after a great deal of experience have adopted these nozzles. In large lots you can get them at quite a large reduction.

Now then we come to another matter, that is we had trouble with these nozzles. They threw rather a fine stream and once in a while they would clog. We then used this separator or strainer. I will unscrew one if anyone wishes to see the construction. While going

through the orchard we were bothered so by clogging that we put on this other strainer. This screws into your air chamber, or below your air chamber and the liquid is forced through here and up through here; it is usually shut off like that (illustrating), or opened by this valve to clean itself if it gets clogged. This union here I will take off; that is pretty well worn out. Now, here, this has been screwed up and here is the sized mesh that we use. Here is a mesh of copper wires, 30 strands to the inch.

Now some years rot is little in evidence and people are apt to relax their vigilence. In fact we have to be brought up with a "round robbin" sometimes before we do our duty. You know that "when the Devil is sick the Devil a monk would be; when the Devil is well, the Devil a monk is he." Spraying is an insurance. I have found spraying as indispensible in raising potatoes as fruit. Our strawberries are sprayed at least once. Melons are sprayed as well, and asparagrass beds to get rid of beetle.

We have had but one complete failure of peaches in eleven years. We have not had a failure of plum, European, in seven or eight years. We control the curculio by using arsenate of lead and have dispensed with the Geneva Bug Cart. In 1906 we raised eleven hundred car loads of grapes and had the rot in control at North East.

MR. HALE.—I don't know whether I want to ask any question or not, but I have been very much interested in this paper, and more interested in the rot. I think the greatest menace to peach culture is the rot, and therefore, I was interested in this paper today. My experience today in Connecticut and in Georgia is, that taking all the different kinds of specimens, the best thing to do is to gather them and burn every rotten peach as soon as it gets to the ground, and burn it quick. We have men enough to go over the orchard and burn up every rotten peach, and we were laughed at for doing it. We pick all such specimens on the trees and destroyed them. We have sprayed a very strong Bordeaux or copper-sulphate wash when the trees were in a dormant condition; we have tried spraying with a weakened solution when the trees were in foliage, and while our friend has done it up in a portion of his orchard, and it is in foliage, don't go home and spray your orchard with Bordeaux mixture: If this gentleman has succeeded in doing it, he has succeeded in doing something that, few in America have succeeded in doing. A number of years ago I sprayed an orchard in Connecticut with four parts of copper-sulphate, and twelve of lime, Bordeaux mixture, and it lost all the foliage. It looked as if it would go to pieces, and I just saved my neck by getting my teams and my neighbors, and scattering over the orchard nitrate of soda, and worked on Sunday to bring about a new foliage. It was such a dropping of foliage that the United States Department of Agriculture sent a man from Washington, and I gave them the orchard to make tests, and they used half a pound up to two pounds of copper of sulphate, to ten pounds of lime, in fifty gallons of water, and every one of them injured the trees to some extent, and there were not one of them worthy of the name of a peach tree. I had been since this shy of spraying peach trees and plum trees with Bordeaux mixture. Four years ago I gave the Department of Agriculture at Washington an opportunity to ex-

periment in our Georgia orchard. It cost me three thousand dollars by experimenting with copper-sulphate. I am speaking from the bottom of my heart and pocket book when I say that they suffered so severely and they still wanted to try it. Two years ago the Department at Washington, kept two or three men in my orchard all Summer, and I had them guarantee that they would pay the damage, and would not take so large a patch. They did it in wet and dry weather, and in every instance they injured the foliage to the great damage of the tree, and I say, if this gentleman can spray his trees in foliage with success, God bless him; go on, but I say don't spray any of your trees in foliage with Bordeaux mixture.

I was glad to hear that our friend gets after the curculio. I have spent thousands of dollars on bumping him off. If you can catch him with arsenic, I would like to see you catch him, and I would like to see the curculio you have caught, but I would say that there has not been anyone in the country, but yourself, to trap the critter, but if you have got on to the job, whether by that double or twisted nozzle that you have, it is God bless you. If you catch him, catch him; I won't butt into the game, but I want to say right here, gentlemen, don't you—don't you spray your Japanese plums or peaches with Bordeaux mixture.

HORTICULTURE AND AGRICULTURE—A COMPARISON.

By D. L. HARTMAN, Etters, Pa.

In comparing these two great branches of husbandry, there is no intent to detract from the one to set in relief, the advantages of the other. So long as the necessities and comforts of civilized existence require the products of both the garden and the field, so long will they stand as the chief component parts of one great industry. But while this is true in general terms, the adaptibility of one or the inadaptability of the other to the locality, conditions and circumstances of the individual husbandman may make the question of success or failure largerly a matter of intelligent choice between them, or a well adjusted combination of the two. Moreover conditions and circumstances have changed so rapidly through increased population, transportation facilities and new phases of competition, that throughout the greater portion of our Commonwealth, as well as in many other parts of the country, the relative importance of horticulture to agriculture is not gauged by the relative oportunities and advantages they respectively offer, but largely by the proverbial conservatism of husbandmen which impels them to cling to accustomed lines, though all former environments have changed. Thus agriculture coming first through pioneering necessity, followed later, by commercial horticulture, necessarily awaiting the development of home markets or transportation facilities, agriculture gained and now holds a far wider following than their present relative advantages justify.

This is not an intimation that there is lack of either room or favorable conditions for the future development of agriculture.

So wide is our domain and so varied local conditions and circumstances within our borders that viewing the surprising results both in production and profits obtained by masterly management on limited areas both in horticulture and agriculture in various sections of the State, it becomes evident that over the vast expanse of the Commonwealth, in her fertile plains, her sunny slopes and sheltered valleys, there are possibilities of development along both these lines, which compared with the present, though creditable showing, make it appear insignificent indeed.

Thus there is no lack of opportunity, but a general failure to fully grasp opportunity by proper adaption. Take for example, conditions here as they exist around the Capital City, which has grown within a century from little more than a village to a prosperous city of goodly size, and vigorous growth, a growth that is adding thousands to her population every year. What changes have taken place in the production of the rural surroundings to meet the demands of these changed and still changing conditions? In the long ago, the villagers were supplied with fruits and vegetables from the surplus products of the surrounding farmer's orchards and gardens, which were primarily intended for home supply. And so far as home-grown produce is concerned, the city must largely depend on that uncertain supply and quality still. The local fruit growers tributary to her markets, making a specialty of the business, may be called off to the fingers of a hand; and while the growers of small fruits and vegetables make a better showing, the supply of first-class home-grown products in these lines is seldom equal to the demand. So day after day throughout the year car-load after car-load of high priced horticultural products of every description arrives from the North, South, East and West, while on every side fine fields of fertile soil in great variety stretch away into distance. These are mainly devoted to hay and cereals as of yore, with possibly an average annual value of twenty dollars per acre, while much of this same soil might just as well be devoted to horticultural crops worth ten times as much. It may be urged, that this is one of the State's most favored agricultural regions. From a geographical survey that may be true; but it is no less adapted to horticultural pursuits and from the import-view-point of demand and supply, and returns for labor involved, the advantage has long been with these. The same general tendencies everywhere prevail, and in many localities the importance of proper adaptation is even more urgent than here. In naturally less favored sections, there are many whose holdings are small or ill adapted to the use of modern agricultural machines. These feel most keenly the competition of the mighty harvests of the Western plains brought to their doors by transportation facilities which they have failed to use advantageously themselves. To them, periods of unusual prosperity may bring, temporary relief, but in the main they are prone to mourn the loss of old time prosperity, all unmindful of the array of new and greater oportunities that have sprung up all around, because they cannot or will not think of deviating from their beaten path. So year after year they plod on, in a half-hearted discouraged way, and their sons

seeing no hope in their father's calling, go off one by one to join the crowded city's throng.

The last census shows that during the previous decade, while the increase of population in cities and towns of the Commonwealth was over thirty-four per cent. the increase of her rural population was only a little more than one per cent.; some districts showing an actual loss. The tendency still remains the same. With such mighty increase of population with consequent increased demands for the necessary products of the soil, why need the husbandman leave the freedom of his open fields, his orchards and his garden? Can there be any logical economic reason why he should? Is not the main reason why he does, the fact that he does not discern his opportunities? And why fail to discern? Partly because they have come so suddenly. In all ages the peculiar environments of his occupation have tended to make the average husbandman adverse to change, and never in history, in any land, have changes been wrought with such marvelous rapidity, transforming a continent, within the span of a few generations, from a trackless wilderness to approximately the conditions of a civilization of a thousand years. Though the American farmer shares this spirit of progress, for his proper adaptation the pace has been too fast. Then too, the very conditions under which agriculture was taken up in this new land, tempting to extensive culture rather than care, have tended to produce slipshod methods, that have all too often been transfered to horticultural lines in which the first conditions of success are intensive culture and scrupulous care. Inevitable failure has been the results, followed by further distrust of all inovations, and a disposition to leave the soil entirely rather than attempt the culture of crops that are new.

Gradually though slowly the increasing relative advantages of horticulture are being recognized, through increasing demands in the vicinities of local markets. Slower still and more scattering is the perception of wide flung opportunities for commercial horticulture in all its branches, due to the extended and ever extending transportation facilities, and the comparative proximity to a large number of the great markets. Some of these opportunities are full fledged but largely ignored; while others are possibilities that might readily be developed. That is there are lines of transportation that having a scattered patronage of horticulture are furnishing prompt service for pershiable goods; while others which would gladly furnish such service were it only worth while are awaiting the call.

In a few localities like the grape district of the north-western and the important apple and peach district in the southern parts of the State, and in several scattered, less important centres of various products a few able leaders discerning the special adaptations of locality to crop, have so thoroughly demonstrated the opportunity as to induce a considerable following. But scattered all over the Commonwealth are numerous localities just as well adapted to these or other valuable horticultural products awaiting a leaders demonstration. Thus in practically every portion of the State there are many engaged in agriculture with slight original local advantage or with past advantage lost, to whom, horticulture offers and will probably long continue to offer undreamed of opportunities.

(Mr. Hiester in the Chair).

THE PRESIDENT.—Any remarks on this paper, or any questions desired to be asked? The subject is before you, if you have any remarks to make.

We have with us the delegate from New Jersey State Society, whom I would like to introduce to this audience. I would like to hear a word from him, if he is present. I refer to Mr. Barton.

MR. BARTON.—Mr. President, Ladies and gentlemen, of the Pennsylvania Association. It is a great pleasure to be with you. It has been a very pleasant and interesting meeting, and if there is any one point, more than any other, it is the strength you have shown in your discussions. Everyone seemed to be willing to talk and willing to stand by them, more so than in our New Jersey Association. You men are specializing on the apple; a few men on the peach business, and that is in striking contrast to our conditions at home. In our little State we have the greatest variety of callings Our men do what you are doing. There, we have one big strawberry man, and in the same neighborhood a big peach man, and possibly a big apple man, and our meetings are up against the different interests, and for that reason our meetings are not as much centralized. We have meetings dealing with all fruits from the cranberry down; therefore, I don't think we maintain the same interest in our meetings as you do in your meetings, and as I have said it has been a very great pleasure to be with you, and I shall report to our society what an interesting association you have here.

THE PRESIDENT.—We have a few delegates from our local County Societies, and I would like to hear what they are doing. I would like to hear from Mr. Fassett, of Wyoming county, one of our new members.

MR. FASSETT.—Mr. President, and fellow members of the State Horticultural Society. I assure you it affords me much pleasure to meet with you. My society sent me down here, not to make a speech, but to use the lead pencil and my brain, and bring back some facts that would be a benefit to our society at home.

We, in Wyoming county, are more particularly interested in the growing of apples. We seem to have conditions there that are favorable to the growth of apples, and particularly the Northern Spy. We think we can produce this apple to perfection, and possibly with the assorting and care that Brother Hale recommends, we might be able to get three dollars a basket for them.

We are practically only a new society in Wyoming county, having been organized about two years. Conditions there were such that we saw we must do something to awaken our people to care for their orchards, because of the San José Scale having made many in-roads in our county, and to Prof. Surface, we must give much credit for awakening our people to fight the pest, and save our orchards, and I want to say that we can't do too much for Prof. Surface, and I hope he may be retained in office.

I thank you for requesting me to come here, and I feel confident that I have received very good facts here that I will be able to take home, and I know our society will be benefited.

THE PRESIDENT.—I want to say one thing, and that is, that the Wyoming Society should meet oftener. They should meet every month.

I want to hear from Adams county. I will call on Mr. Elden, President of the Adams County Fruit Growers Association.

MR. ELDEN.—Mr. Chairman, and fellow members of the Horticultural Society. This is very unexpected to me, as I expected Mr. Tyson to speak for our society. We organized about three years ago, and have about one hundred members. We are not what is called co-operative; we have no time to sell or buy anything co-operatively, but we are rather united for the purpose of fighting these pests. If we know anything, or are persuaded that we know anything, we are to first tell that to everybody that we reach, and that is a criticism of one or two organizations whose proceedings they seem to hold back. We are very anxious to pass it along, and that I think is the life of the county organization. If we have something in our practice that is to us apparently of more value than that which is on our program, we let our program go, and take up this other matter. Our program is a secondary matter, and we let it go.

We come from the land of the York Imperial apple, and it will be heard from. Our products, as yet, are not very extensive but we are expecting great things from new plantings. We expect also to plant some Stayman Wine-Sap, Grimes' Golden and Jonathan.

I am glad to meet with you, and I want to say if there are any gentlemen who contemplate organizing, you can't get together too early. Get together in a house and organize. Some of you gentlemen, perhaps, could buy a house, and you would have a place to meet. Meet once in a month, and meet on a Saturday night, and we invite all of you to come and meet with us. We had our second annual convention in December.

THE PRESIDENT.—Mr. Lee, can you tell us anything about that Bedford County Society.

MR. LEE.—Mr. President, ladies and gentlemen. We have a small society in Bedford county of about thirty-two members organized some two or three years ago. I think they met once, and elected their officers, and that was the last meeting they had. At that last meeting, a State Board member came and myself and one or two others, and we tried to re-organize the association, and after I moved back from Harrisburg, I got them together, and got the society re-organized, and got it moving along for two or three meetings, and the officers did not turn up and I thought the association was going to die again, and last Saturday, the Corresponding Secretary, not being satisfied with the association going back so soon, called on me and said I should call a business meeting, that he had some resolutions to adopt to be sent to the Department at Washington, and the program was announced, and I suppose we will go on as we have heretofore. We generally meet the last Saturday of every month. We had several good meetings, which were of an instructive character, and were very well attended, and it certainly looked bright, and I will do all I can to try to get the interest stirred up, because there is a whole lot of fruit raised in Bedford

county; more than people have any idea of. It was estimated that two hundred carloads were shipped out of Bedford county last year, and we did not have a very large crop. I know they have three packing establishments there in Bedford, and they are all full. Dr. Gump is supposed to have six thousand bushels; S. B. Brown has quite a large amount of fruit. His trees are young. There has been a good bit of heavy planting done. I believe one man is going to plant very shortly something like one hundred and fifty acres, and he is going to plant it in apple and peach. He intends planting some. thing like thirty-five hundred peach trees, and expects to get a soil survey by the United States Department of Agriculture, which I think will stimulate more interest in fruit culture in Bedford county than anything else, because our land is well adapted to that purpose. I don't suppose there is anyone there who has more than four or five thousand trees, except what this man is putting in. I suppose there must be twelve or fifteen persons who have from three thousand to thirty-five hundred trees planted, so that in a few years there is going to be quite a number of large orchards.

I am also inspector and demonstrator for that section. We have some scale down there, and out of eight hundred orchards I examined, I found three hundred and forty that had infested trees. I hope we can have an annual meeting at Bedford next year. We are going to make quite an effort to accomplish it.

The only thing I am sorry for is that the Home Society is not here so as to see what might be possible at the meeting. It did not seem posssible to send any delegate to the Adams County Association, but I hope by another year we can get some delegate to attend that meeting.

Thanking you for your kind invitation, I will give way to someone else.

THE PRESIDENT.—We have one more report, and I would like to hear it; it is the report of the delegate we sent to the New Jersey Association. I call on D. M. Werts.

MR. WERTS.—Mr. Chairman, and fellow members. It was one of my pleasures to be one of two delegates to be sent to the Trenton meeting of the New Jersey Association. I want to say it was a pleasure and benefit personally, and I wish it were possible to transmit that benefit to each and every member of this society here. I must say they had a very good meeting. The conditions are differ ent from our State, and especially are the conditions different somewhat from our State, on account of the northern part being more interested in fruit, and the southern part being more interested in vegetables, and being interested in reaching the markets, not through transportation alone, but in delivering them personally to the common market in Philadelphia. Of course, it is true that the city of Philadelphia, that belongs to our State, is a market to the New Jersey growers of products, and doubtless much more so than it is to Pennsylvania.

We observe that they were wide awake, and up to date, and understood the manner of fruit growing, as well as trucking.

There were a number of growers there who are extensively in the business, and who are able to talk of it not only from a theoretical sense, but with the knowledge that comes from actual experience.

It is one thing to know it, and still another to practice it, and still another thing to produce it with success, and I believe in many cases we should pattern after our brothers across the river, and in doing so, it would result in profit to us.

It was a very pleasant trip, and we were very glad to have been honored by an election as delegate from your society. I hope in some way we may be able to give you some of the benefit that we derived ourselves.

MR. YOUNGS.—I want to say that I am a member of the Erie Horticultural Society. I don't know whether you feel like making a visit so far away, but I want to extend to this Association, and its members, a very cordial invitation to come over to our place. We have plenty of hotels to take care of you, and we would like to see you. You will find our latch string is out. Of course, it is a matter of three hundred and fifty miles over there, but you can get a reduced rate, and we can also have a side trip and go down through the Chatauqua grape belt region. It would be a delightful place to meet.

THE PRESIDENT.—I am very sorry the gentleman was not in the room when the question was up for the selection of another place. We had only one invitation. I have been in that farming community, and I would like to see this association meet in Erie, for I think it would be a good thing. They have been in the business of growing fruit for many years, and can give us a great many points as to fruit growing. I hope Mr. Youngs will be at our next meeting, and extend that invitation to us, for I think it would be of great advantage to meet there. I don't think it would do us much good to go to Niagara Falls, because most of us went there on our wedding trip, but to go through that great Chatauqua grape belt would be of great benefit.

MR. YOUNGS.—If you feel inclined to come and meet with us a year from your next meeting, you can come, whether we are here or not. You can correspond with us, and we will respond.

RECENT DEVELOPMENTS IN SCALE REMEDIES.

By PROF. H. A. SURFACE, Economic Zoologist, Harrisburg, Pa.

PROF. SURFACE.—It strikes me that it is unnecessary to speak at length on this subject when I am publishing in my bulletins each month the latest and most reliable facts that are to be obtained concerning it. These bulletins are sent free of charge to all who are interested in them and extra copies are kept for distribution among people who make special calls for them. The formulae are there printed in detail and it would be better to use them than to have me here repeat what they contain.

I am trying to find time to boil down and print the result of our experiments with the various materials for the San José Scale, especially the latter results with commercial insecticides. It is my intention to publish this in the February Bulletin, as that issue is always on scale insects.

A year ago I read a letter from one of our inspectors in Centre county; in this he outlined the conditions as he there found them and showed that there existed a scattering infestation of the San José Scale with very great indifference on the part of tree owners as to the result of the presence of this pest. However, by our work, including my own individual efforts and lectures in that county, many of the farmers and fruit growers were awakened to the importance of doing something and took action. It is now interesting to see the results of that start made a year ago. I have before me another letter from the same inspector concerning his second trip to the same region but written one year later. This was not written with a view of publication and is a sample of the bona fide correspondence and reports sent to me by our inspectors and demonstrators regrading the practical work we are trying to do in the different parts of this State. The letter is as follows:

"Rebersburg, Pa., August 29, 1906.

Prof. H. A. Surface,
Harrisburg, Pa.

My dear Prof. Surface.—On my way to Pine Grove Mills on Monday I took a day to go to Rebersburg to see what results the work of last December was bringing. I was very much pleased with the results and found that a large number of men had taken up spraying. I also looked for the spread of the scale and found that where men had not taken any precaution the scale had spread very badly. Along this line I would cite the case of Mr.————, orchard, about one mile west of Rebersburg. Last December I found one tree or so on which a few scale could be found. Yesterday I found at least twenty-five or thirty trees infested in the neighborhood of this one. Mr. ———— did not spray his trees but I am convinced now he will spray as soon as he can. Mr. ————, remarked after we left last December that we were only going about the country trying to scare people into spraying so as to make sale for pumps, etc., and that he would not be scared into it. I believe he now see the importance of our work. Very different from this is the case of Mr. Charles Bierly, of Rebersburg. He has an orchard of nearly eleven hundred trees. Last fall we found scale there, some trees being badly infested. He secured a good spray pump with all necessary attachments for successful work and sprayed this entire orchard. He practically rid his orchard of scale, besides cleaning up his orchard in good style, making it have a thrifty good appearance and quite a sprinkling of nice perfect fruit, which is rare in this locality. Mr. Bierly is now a thorough convert to the spraying and lime-sulphur-salt doctrine and tells me he will spray regularly. He tells me the entire cost of spraying his eleven hundred trees was only about thirty dollars.

The only trouble I find in the prospect of spraying is that so many of the citizens of Rebersburg, who are interested in spraying, are purchasing "tin cup spraying outfits" instead of good substantial

outfits wherewith they might do successful work. But nevertheless even with their "tin cups" they are doing some good successfnl work and many trees in Rebersburg have taken on a new lease of life. Some trees that were almost dead are now thrifty and as a result I could name a score of men here who are thoroughly convinced of the benefits of lime and sulphur.

Very respectfully yours,
Charles A. Heiss."

A MEMBER.—What age were the trees that were sprayed at a cost of only thirty dollars for eleven hundred trees?

PROF. SURFACE.—I do not know but they were bearing trees.

MR. HALE.—What kind of trees were they?

PROF. SURFACE.—He does not say but I think they were comparatively young trees.

Now I am to speak a few minutes about scale remedies. We have all shades or grades of degrees of efficiency from those which are absolutely worthless to those which are very good under some conditions. I feel it my duty to give expression to the results of my investigation of a material called "Scale-kill" made and sold at Waynesboro, Pennsylvania. It is a powder intended to be put into holes bored into the trees. I had it analyzed and found it to consist of powdered sulphur, rosin and gun-powder. It cost the manufacturers, perhaps, four cents per pound and they sell it at one dollar per pound. After I made a conscientious effort to learn if it would kill San José Scale, and found that it would not, we inspected several trees where it had been used and found that fruit growers were likewise having no satisfactory results with this material. I learned that the originator has sold his claim to a local druggist and moved west. It is still being made and sold there and sent into different counties of the State and different states of the Union. One dealer in Chambersburg said that he sold forty pounds in one week. The makers claim that the reason it has not previously been successful is that the holes in the trees were bored in such direction that instead of settling out and resting on the sap wood, where the growth takes place, it settled in toward the heart of the tree and consequently was not taken up into the circulation with the sap. They now say that the thing to do is to bore the hole upward at an angle and put the powder in and then cover it with a piece of tin or something of that kind and let the material slide outwardly in the hole far enough to let it rest on the sap wood, with the thought that it would be taken up with the sap.

I should mention another material, namely: caustic soda dissolved in water which was brought into prominence in this State by publication in a very reliable agricultural paper, namely: The Farm Journal, by the publication of a prize article on the San José Scale and its remedies. Practical men have told me that they have lost their fruit and trees by depending upon it as it did not kill the scale.

Another preparation which was given considerable attention in Delaware was "Limeoid" which is a kind of kerosene emulsion made by stirring finely powdered or selected lime into kerosene oil and then mixing it with water. It was then to be sprayed on the trees

to cover them entirely the same as other proposed remedies. The principal here is that each grain of lime was coated with a film of oil and thus the lime was heavy enough to hold the kerosene down in the water and made it appear like a kind of an emulsion but the difficulty was that the same law of capillary attraction which made the film of oil and encircled the grain or speck of lime prevented it from spreading fully over the portion of the branch or twig it touched because it would not all leave the lime particle; some encircling this while a portion of the oil spread to the tree but did not give full effect.

My views today of the San José Scale and the best remedies of it are pretty well expressed in my bulletins and yet I feel like going to every source possible to obtain accurate information that will be helpful to myself or the farmers of this State in this regard, consequently I read from a bulletin by the State Board of Entomology of Georgia and prepared by Prof. R. I. Smith, the State Etomologist of that state.

I must say that I fully endorse the summary here given by Prof. Smith, in practically every point. He says: "Badly infested orchards should be sprayed twice; once in fall and again the following spring." I think that is very important. "Orchards which cannot be sprayed twice should be given one thorough spring spraying. Large orchards will have to be partly sprayed in fall or winter."

This is because it is impossible to get entirely over such orchards during the spring time alone. The reason also for this is that the best possible time of the year to spray is just before the buds burst. If the lime-sulphur wash be put on thin the leaves will soon appear and cover and protect it and I have seen it remain on the branches in December. I wish to pause, in my reading here, to say, that many people ask me if I cannot spray only the trees that are infested and let those go upon which no San José Scale is seen. I must say that this method should be avoided and if there be only one infested tree in the orchard all others should be sprayed as a means of precaution because it is possible for the scale to spread from this tree to anothers perhaps a quarter of a mile away. It usually spreads to the adjacent trees gradually but quickly.

"In such cases spray the least infested portion in fall or winter, and the worst infested portions of the orchard in spring. Or better yet, spray the worst infested portion both fall and spring. Convenient, serviceable boiling arrangement must be provided for boiling lime sulphur wash."

I find one of the most convenient as well as cheapest methods of boiling this wash is to build a sheet iron vat shaped just like the lid of a paste board shoe box with the edges turned up at the sides and ends. Building this up with boards at the sides and ends, nailing the sheet iron to these boards and make it all tight enough to hold water. It is the cheapest thing you can get for boiling the wash quickly and easily and will last a long time. Such a vat or box can be placed over two stone walls for support making thus a kind of furnace into which rough or old wood can be pitched to keep up the boiling. If you have an engine that will furnish live steam and wish to boil by this method it will be perhaps the cheapest and best way of boiling the lime-sulphur wash. Conduct the end of the steam pipe to the bottom of the barrel, tank or vat and put into it

the lime and sulphur and water and turn on the steam and let it boil for the full length of time desired without even being obliged to stir it.

It will surprise many to learn how long galvanized iron lasts for this work, while copper is destroyed at once by boiling material in it, we find the galvanized iron does very well during several years if not permitted to rust out. One of the demonstrators had a galvanized iron hog scalder which he used as his boiling kettle and from the satisfactory results with that we took the hint and constructed several such tubs for use in our experiments because they were lighter and more convenient than iron kettles could be which were of such size as to hold the same quantity.

"Steam boiling outfits are most desirable when considerable quantities of lime-sulphur wash must be made."

Where a person desires to make a small quantity to use on a few trees either with a paint brush to cover the trees thoroughly from top to bottom, by painting or with a spray pump, he can easily do this on his kitchen stove by opening the windows and boiling the material in an old tin pan or even an iron dinner pot. In fact the vessel will not be injured for domestic purposes by putting it, temporarily to such use. I don't want to give the impression that the lime-sulphur wash is absolutely necessary for the stamping out or the control of the San José Scale. Persons can use successfully other insecticides such as kerosene emulsion, twenty-five or thirty per cent. or whale oil soap two pounds in one gallon of water, or some of the good commercial insecticides that are on the market and are well recommended by reliable persons.

"Iron kettles may be used for boiling small quantities of lime-sulphur wash. When such kettles are used set them in a brick arch. Spray pumps capable of giving sufficient power to throw a strong spray should always be used."

This comes back to Mr. Heiss' so-called "tin cup" sprayers and their inefficiency and unsatisfactory results.

"Whenever more than a few trees are to be sprayed, it does not pay to attempt to use small, cheap spray pumps. Thoroughness in spraying is necessary in order to secure satisfactory results. This rule applies no matter what mixture or solution is employed for spraying the trees."

I have made a special study of the causes of failure in spraying for San Jose Scale, and the chief cause in most cases is the lack of thoroughness of application. This must be emphasized. Whatever material is used, should be applied thoroughly from the tips of the highest branches entirely to the base of the tree in a double coat, or two good, thorough applications, one following the other as soon as the operator may wish to make it, or in case of use of any material that leaves a stain like the lime-sulphur wash. The retouching spray can be given at any time after the first coat is dry enough to let the operator see what spots were missed the first time. In Franklin county many of the fruit growers were becoming discouraged and, in fact, disgusted with the lime-sulphur wash, saying it did not kill the scale on their trees. By personal examination I decided that this was due to lack of sufficiently thorough application and to giving it a final and complete test. Mr. Clayton Miller, of Marion, sprayed his apple trees five times, one after the other, for the sake of thoroughly covering the bark at every place. On the 6th

day of last December he reported to me that the results of this work last spring were highly successful and eminently satisfactory.

MR. HALE.—That is true. The chief feature of failure is a lack of thorough application or failing to cover the trees entirely.

A MEMBER.—Does it make any difference what kind of sulphur is used?

PROF. SURFACE.—We shall come to that in a minute as it is mentioned further on in this bulletin. It is all right to ask those questions but the author says here something about the sulphur which we shall soon discuss. "The lime used in preparing lime-sulphur wash should be calcium lime instead of a magnesia lime."

You who have not read my November and December bulletins will consider this a new point but it was there discussed and I there said it should be calcium lime instead of magnesia. I think the reason for this, is that the calcium is much stronger or more caustic while the magnesia is a nice mild white lime which when combined with sulphur makes a mixture of different color but not so strong in its killing effects on the scale. In boiling the wash, the operator can know whether he has calcium or magnesia from the color it assumes when cooked nearly an hour. The calcium mixture becomes the color of tomato catsup or boiled tomatoes, and cannot be cooked to the point of changing on to a dark olive green color. While magnesia lime may become first the color of cooked tomatoes but will later change to a dark or dirty olive green color, although it does not always pass through the red or tomato color stage.

A MEMBER.—Where will we get the best quality of lime in Pennsylvania for spraying purposes?

PROF. SURFACE.—I find that the York lime is a good calcium lime, while much of the Chester county lime is magnesia.

I believe the next important problem my office should take up is a study of the limes of Pennsylvania in relation to this point and their efficiency in making good material that will kill the scale. Many of the limestones of this State contain both calcium and magnesia and consequently we may get the red color before the olive green, or we may get a combination or mixture of the two. This is a question pretty well discussed in a West Virginia bulletin and any person can get it free by writing for it to Morgantown, West Virginia.

A gentleman from New Jersey.—We get a coffee colored mixture when we boil lime. I have been brought up on that quality of lime. Am I to understand that we are wrong?

PROF. SURFACE.—The coffee colored mixture would not be so bad as it indicates a mixture of both lime and calcium in the limestone with doubtless enough calcium to bring good results. "Sulphur may be purchased in different forms but the grades most highly recommended are 'flour' or 'flowers' of sulphur." The flower of sulphur is ground sulphur from cakes which have been melted and allowed to cool and thus harden. It is not as finely divided as that form called the "flowers" of sulphur which is prepared by sublimation or heating the sulphur and driving the fumes against the walls of the room where it collects by settling the same as soot or lamp

black on the inside of a lamp chimney. A difference of boiling ten minutes will dissolve the "flour" of sulphur as perfectly as the "flowers," meaning that the former may require just a little longer on the same principal as it takes slightly longer to dissolve coarse salt than the fine, but an hour of hard boiling is sufficient time for either kind.

"Self boiled lime-sulphur washes may sometimes be used with success, but they are not recommended for general use on account of the extra expense involved."

The self-boiled wash is where caustic soda or some other material is used to produce artificial or chemical heat, but this is very expensive and requires more care than the boiled lime-sulphur wash and does not increase the killing efficiency of the mixture. It only overcomes the necessity of fire and a kettle for boiling because it can be made in a barrel if this be covered with blankets to hold the heat.

"The addition of tar, potash, lie, copperas, bluestone, or any other substance to the regular lime-sulphur wash, does not appear to be necessary or desirable on account of mixing the mixture more costly."

This is because the boiled lime-sulphur wash is itself a fungicide and appears to be fully as efficient alone as it can be made by the addition of those other substitutes.

Experiments conducted by individuals often result in valuable discoveries. Fruit growers are urged to make experiments with any remedy for San José Scale, but to do so on a conservative basis.

The importance of this is illustrated by the result of a fruit grower, who writes in a recent agricultural publication that he dipped three thousand trees in lime-sulphur wash, probably hot, and killed them. It would have been better had he experimented by dipping perhaps ten and waiting to see the results of such treatment. I do not, by any means, recommend any new scheme, project, method, nor material on an extensive plan because of the great loss that may come if this should fail.

MR. HALE.—I have dipped thousands of them in a cold mixture and it did not kill them.

PROF. SURFACE.—Did you dip the roots also?

MR. HALE.—No sir.

PROF. SURFACE.—"The San José Scale may be kept in control if all who have infested orchards will apply the remedies recommended."

Now, friends, I would not hesitate to plant an orchard either with or without infested trees in the heart of a badly infested district, and under such conditions should not at all feel it obligatory upon my neighbors to treat their trees as far as the safety of my own would be concerned.

A MEMBER.—You can't keep it off the tree?

PROF. SURFACE.—To a very considerable extent.

A MEMBER.—If a neighbor has the scale on his trees it will get on your fruit?

PROF. SURFACE.—Not to great extent. If I spray my trees I do not believe it is possible to wipe it out entirely, but if we can control it so as to produce first class fruit, in spite of its existence, we shall be as successful in commercial fruit growing as though it were exterminated.

"It is better to spray orchards from one end to the other when only a few trees are actually found infested, and thereby prevent injury, rather than to delay the spraying until the orchards become badly infested by the scale."

Now I had hoped to give you at this time the results of our tests of different commercial insecticides, but we have not quite finished the study of the field notes on these, although they will be published in our next monthly bulletin. These results, however, are so well expressed in the New York bulletin, which I hold in my hand, that I shall read it to you and give you my sentiments. This is from a summary of a series of extensive experiments with commercial insecticides, published in Bulletin No. 281, of the Geneva, New York State Experiment Station. It may be obtained free by writing for it. Prof. Parrott, summarizes his experiments and I shall read you less than a page of his conclusions.

"This bulletin contains the details of a number of experiments with commercial miscible oils to determine their merits for the control of the scale. This work was conducted in three orchards in which 1,368 trees were sprayed with these preparations in various proportions. On the basis of these tests the following conclusions are drawn:

"Applications of proprietary miscible oils at the rate of one part of oil to twenty or twenty-five parts of water, fail to give uniform results on scale. Trees receiving these treatments usually showed more or less spotting of the fruit and varying infestation of the new growth.

"Miscible oils in the proportion of one part of oil to ten or fifteen parts of water, while uniformly more destructive to the scale than the weaker preparations, were usually not quite so efficient as the boiled lime-sulphur wash. These stronger applications destroyed large percentages of the scales, being sufficient effective to maintain the thriftiness of the trees and to keep the fruit crop fairly clean. On the basis of these results even the better ones of the miscible oils tested should not be used in weaker mixtures than one part to ten or fifteen parts of water.

"The miscible oils are commercial insecticides and therefore the orchardist should understand that the reliability of the stock material rests with the compounder. These sprays are simple to prepare for use, and are convenient preparations for the treatment of old trees and small orchards."

That is where I endorse them specially as they are easily prepared and applied, if a person should not desire to make the homemade insecticide for use in only small quantities.

"The cost of the miscible oils in the proportions of one part to ten or fifteen parts of water makes their use almost prohibitive for commercial orchardists who desire a safe and comparatively cheap oil spray. Compounds of commercial insecticides should endeavor to produce a reliable miscible oil that is cheaper than present brands."

MR. HALE.—I would like to say a word on this subject. I was particularly interested in the remarks made by Prof. Surface, with reference to the situation in Pennsylvania and his suming up of his results in connection with the use of the lime-sulphur wash. I have had the San José Scale for many years and fought it in various ways. We are always looking for the easy way out. At the present time the people who are exploiting the oils are getting good money from the people because it is the easy way out. If I had two or three trees to treat I would give up the tree if I had to use the lime-sulphur wash. or I would use whalebone soap or oils, but to the commercial orchardist I would recommend the use of the lime sulphur wash. I have had five hundred barrels of sulphur and boiled it up and there is no question but that the lime-sulphur wash is the cheapest; on top of that it is a splendid fungicide and we get a splendid result there. It also controls the leaf curl and controls the brown rot and all our fungus troubles. On top of that it has a stimulating effect on the growth of the tree. You spray one row of trees with the lime-sulphur wash and let the other row beside it go without spraying and you will see the good effects of spraying. Those are the reasons that would continue to hold me to the use of it.

Now Brother Brown, you say it is hard to get labor because labor is getting scarce, it is getting more independent, but in the last six years I used about six hundred barrels and I never had a man to leave the farm on account of the use of lime-sulphur wash. We furnish them with proper clothing and vaseline to use on their faces, although I would rather go to a picnic than a spraying. There are times that oil will come in. There is a value and place for it at times but it seems to me that its principal place is where the owner has only a few trees. I don't think it will kill the scale as thoroughly as the lime-sulphur wash. I believe the lime-sulphur wash is the best but I do not deny but what the oils will keep it down and there is a place for it on the small orchard and small grounds.

However, it will be a long time before you are able to find anything equal to the lime-sulphur wash to destroy the San José Scale and in the use of this wash I have been impressed with the idea that God sent the San José Scale for the use of the lime and sulphur on our trees on account of their being other good results in connection with the growing of the trees in the use of the lime-sulphur wash.

MR. PRATT.—Mr Chairman and gentlemen: I usually refrain from saying anything in a meeting of this character simply because of being the originator and manufacturer of the soluble oils, still I think it is due not only to myself but to other manufacturers of soluble oils that I should say a word.

I believe it has been conclusively shown that the soluble oils, when applied in the right and proper manner, are just as effective as any insecticide we have in killing the San José Scale. This has been proven in the thousands and thousands of barrels of oils that we put out during last year. The question has been brought up in our experiments stations as to why there have been some failures and I have for the past few months been looking into this matter as thoroughly as it was possible for me to do so, and I have been sur-

prised to find out how little we know about thorough spraying, not only in the application of lime-sulphur and salt, but in any of the soluble oils. That has been brought up by Prof. Maynard; he made this remark, that a general application will not do. I have had sprayers come to our office and argue that it would not do. Did you ever see that window pane and the rain spots drip on the panes of glass and how it spread about there? The oil has the same effect when it drops on any surface because it spreads after it drops at any particular point. In all meetings I have attended I find that the question most discussed is the thoroughness of spraying rather than the material you are using. I believe before another year is out we will convince Brother Hale that the soluble oils are cheaper, lower in price today and easier in application, than any other preparation on the market that we can use as effectively against the San José Scale.

It would not have been any inducement for me to go into the manufacturing of soluble oils if we could not control the scale in commercial orchards. Our ambition is far beyond the cleaning up of the back yard orchard. If we cannot do the work for Mr. Hale, and other commercial fruit growers, better than in the use of anything else it would be of no value as a manufactured product.

One other thought I desire to express is this, we do not yet know what the fungicidal qualities of oils are. You remember that this lime-sulphur and salt wash was used for a good many years before its properties were appreciated. The oils have only been out for two years, and as a manufacturer I want to say this, that I have spent night after night in the labratory working over this matter and we are ready to take up this work. We believe we are doing a good work for the fruit grower.

The question as to the price was brought up and I want to say this, that we have not an agent who does not make more money out of it than we do as the manufacturer. We have 70 per cent. of petroleum oil and 9 per cent. of vegetable, and 8 to 10 per cent. of chemicals, and that 10 per cent. of chemicals cost many times more than the 70 per cent. of petroleum. Prof. Surface spoke of one globule of lime holding a number of globules of oil around it. You remember the petroleum is not acted on as an alkali or an acid, but it will separate from the little globules in the oil and it is in the breaking up of those globules that we are able to make it spread out and cover a larger surface. We feel we have broken is up about five times as small as it was before.

We don't know what the fungicidal properties of oil is going to be. We are working with and for the fruit grower to do all we can. Say what you please about the lime-sulphur wash it is a mean thing to handle and everybody is trying to get away from it.

MR. WOLFF.—I would like to ask these commercial people how they are going to show that these materials can be put on as cheap as the lime-sulphur wash. You can buy sulphur at five cents a pound and lime at about one-half cent a pound, and in making up the different parts it will not cost more than two cents a gallon. Please explain how the material of which you speak is as cheap as lime-sulphur wash.

MR. BROWN.—We will furnish scalecide at fifty cents a gallon delivered anywhere east of the Mississippi River and north of the Ohio and we will deliver it at sixty cents a gallon anywhere in the United States. We guarantee that five gallons of scalecide in ninety-five gallons of water will kill every scale you hit with it. That will cost two and a half cents in this State and three cents a gallon anywhere.

There is one preparation on the market that is almost identical with scalecide with the exception that it has sulphur in it and that is called kiloscale. One gallon will cover twice the surface in spraying with the same quantity of the lime-sulphur wash. The one is a thin watery substance and the other is a whitewash. It may be applied in one-half to one-third the time. In other words, the labor of one hundred gallons of scalecide will cover twice as many trees that you will with the lime-sulphur wash and you will find it cheaper if you figure it out; take a cent and a quarter a gallon for the lime-sulphur wash, because your labor is cheaper. I have never heard of anybody who manufactured the lime-sulphur wash and putting it out for less than two to three cents a gallon and scalecide is worth two and a half to three cents a gallon.

I have had some experience in spraying—having about 7,000 trees —and have been spraying for 15 years. We do commercial work, running a large power spraying outfit, putting out from 35,000 to 40,000 gallons of spray material annually. I travel a great many states—selling spraying machinery and materials—which gives me unusual opportunity for observation and brings me in touch with many of the most extensive fruit growers of the country, by which I am enabled to study their methods. I have used to a greater or less extent, every leading remedy for San José scale upon the American market, have been fighting this pest for twelve years—and my experience leads me to believe that any one of these remedies is effective in controlling the scale, if properly made and thoroughly applied. Some are more dangerous than others. This applies more particularly to petroleum oils, but we are now familiar with their use, so that even crude petroleum can be applied without any danger attending the application. I used the lime-sulphur nearly six years with good results; three years of this time I used the self-boiled chiefly—and with perfect success, so when I hear entomologists and fruit growers say that the self-boiled lime-sulphur wash is not effective, I feel that they do not know what they are talking about. In the use of any of these remedies, success depends entirely upon the thoroughness with which the work is performed. In fact it depends upon the man behind the nozzle.

In Delaware we have practically abandoned the lime-sulphur wash, the same is true of many of the larger fruit sections of the country, not because the L. S. wash would not control scale, but because of its many disagreeable features. Our people are now using scale remedies with an oil base—and since the introduction of the "soluble" or "miscible oils" and their value fully proven, we have abandoned the sulphur washes and have taken to the use of the miscible oils. I do not say this because I am interested in the manufacture and sale of these remedies, but because they promise to control the scale more easily and more cheaply than any other remedy. I believe I am well enough known upon this floor, not to be charged

with recommending anything except what I honestly believe to be the best interest of the fruit grower.

These miscible oils are not expensive, are thoroughly effective, mix readily in water, and if properly applied, will kill scale at the dilution recommended by the manufacturers, viz: One to twenty. When all things are considered they are cheaper than the L. S. wash; they are pleasant to handle, neither injuring pumps or workman, very quickly prepared, never clog pumps or nozzles, and will cover one-third to one-half more tree surface per gallon than the lime sulphur wash. This is not all, for the same force, with a pump using the miscible oils will cover from two to three times more trees in a given time and do it better than with the sulphur wash. This makes it by far the cheaper remedy. I know these may seem like strong claims, but to prove them I here and now challenge any entomologist or fruit grower to a field contest, either in an orchard or public park, and I will prove that these oils, when properly applied, are not only more effective than the L. S. washes, but very much cheaper. Were we able to secure all the evidence, I am fully convinced that a very much larger percentage of those using the oils have been effective in controlling the scale than those who have used the L. S. washes. In my own State the miscible oils have solved the problem. Last week we held a three days' session of the Peninsula Horticultural Society at Dover, Delaware. There were from 600 to 1,000 fruit growers in attendance at the sessions, and in all that time the question of the control of the San José scale was not raised, nor the subject discussed, because our people felt that they had at last found something that would control the scale.

We have used the soluble oils during the last three years, but very extensively the last year with the above result. I have a letter received today from J. W. Killen, of Felton, Delaware, known to many of you as the largest private experimentor east of the Mississippi River; a man who has propagated more new varieties of chestnuts than any other man in the United States. Last spring he had a badly scale infested peach orchard. He says his trees were nearly dead, so that their recovery even with the best of treatment, was extremely doubtful. Both sides of the orchard was treated with Lime Sulphur wash with good results. The center was treated with Target Brand Scale Destroyer with very good results, not only in destroying the scale but the trees where the scale destroyer was used made a larger growth of wood and held their foliage three weeks later in the season than where the Lime-Sulphur wash was used. This would make it appear that the application was beneficial to the trees. An extensive experiment, conducted the past season, in dipping nursery trees before planting, shows exactly the same results as Mr. Killen found. From this it would appear that the miscible oils possess a fungicidal value as well as being a sure insecticide. I feel sure we are just on the threshold of great possibilities with the oil washes, many claim they are still too costly. I contend they are not when all things are accounted for—but if they are, they are the best scale remedy and the best is not always the cheapest so far as dollars and cents are concerned—but measured by final results, they are cheapest. What we want and insist upon

having, is that wash that is the most readily prepared and applied, and is least injurious to spraying machinery, teams and workman, and most effective in destroying insects and at the same time being most beneficial to the tree. Upon this we are a unit—and I believe we have to-day in the soluble oils just such a remedy, and there is abundant testimony from others showing them to be of the same opinion. Therefore I cannot understand why our Experiment Stations and fruit growers too, will persist in recommending that nastiest, mean, contemptible and most disagreeable wash when something better and pleasanter, and, really, taken as a whole, more economical, can be used.

In many places I find that laborers refuse, absolutely, to work in the L. S. S. wash. There was a time when a laborer who refused to do as his employer directed was dismissed, but this is not the case to-day, the laborer is independent and when he refuses to work in the Lime Sulphur wash because of its disagreeable features, we will be compelled to use something else.

Very extravagant claims are made for the Lime Sulphur wash. Prof. Taft, of Michigan, says he can control apple scab with this wash. I cannot believe Prof. Taft meant this, because this disease will attack your fruit at a time when you would not dare treat them with the L. S. wash.

A few weeks ago I addressed a meeting of fruit growers at Kalamazo, Michigan, and after the address a strenuous advocate of the Lime Sulphur wash stated that he had been very successful with this wash and would continue to use it. He said that about three days after applying it he would go all over his orchard and touch up such places as had been missed, and a week later he would go over it again. That grower told the whole story, but how could anyone having 100 to 1,000 acres in his orchard, go over them two or three times.

It is also passing strange to me that all those who are advocating the use of the soluble oils should be charged with insincerity, or that only those were advocating the use of the oils who were directly benefited by their sale. Should this be true, then with equal certainty could all entomologists and officials be charged with having an interest either directly or indirectly in the sale of lime and sulphur, and cooking apparatus. In conclusion, I am firmly of the opinion, and make the unqualified prediction, that if this San José scale pest will ever be generally kept under control in the United States by artificial means, it will have to be with some remedy having an oil base, and the higher the oil figure, and the freer from deleterious oils the better. A natural enemy in the form of a parasite that will attack and destroy the scale, is still our longing hope.

Adjourned.

Evening Session, 7:30 P. M.

THE PRESIDENT.—The chair announces the following Legislative Committee: Hon. William T. Creasy, chairman; D. M. Werts, H. A. Surface, E. B. Engle.

Chairman General Fruit Committee, C. J. Tyson.

VARIETIES OF FRUIT BEST ADAPTED TO COLD STORAGE.

By GEO. H. McKAY, Philadelphia.

Mr. Chairman, Ladies and Gentlemen: I assure you it is a pleasure for me to meet with the fruit growers of Pennsylvania. Probably I am one of the oldest men present here, although younger in years than many of you, who commenced to raise fruit. I raised fruit in Maine in 1869, and those trees are still bearing fruit—they are spraying them. I don't know what they are using, but if they lived in Pennsylvania they would certainly have their choice of the different things to spray with.

As you all know, the management and control of fruit has changed wonderfully in the past few years, and one of the important questions that presents itself to large growers of fruits is the question of supplying the people with fruit in the most satisfactory manner, the people in the cities particularly, and how to store away better fruits for these people. One of the prominent necessities was found to be the establishment of cold storage plants, and in that business I have had about twenty years' experience in keeping different food products for the people of Philadelphia and other places.

The keeping of apples in cold storage is only one of the many things that can be kept in refrigeration, and if you could visit one of those large plants established for that purpose, even larger than the Terminal Cold Storage plant at Philadelphia, you would find almost everything raised, not only in the United States but in the world, is kept in cold storage, from the simple fact that if a large supper is given by a millionaire, or any one else that can afford it, they often want a variety of things at a seasan of the year when they are not growing, and that which comes the highest they want the most, hence immense quantities are being stored for the people in the cities.

The market that I have the pleasure of being connected with covers a block, a space of 350,000 feet being given over to cold storage. We have stored there at the present time some thirty thousand barrels of apples which were raised in Pennsylvania, Delaware and New York. We do not store many of the Western apples; as a general thing they come in crates and do not keep very well with us, although I suppose they have their market for them and do store them in the West.

I wrote something on this subject but it seems to me that Mr. Hale, Mr. Brown and some others copied my speech and as they have gone over this ground so thoroughly it is almost impossible for me to add much to what has already been said. However, I desire to say that in order for a fruit grower or a farmer who raises fruit, to make any money out of the products of his farm or orchard it is necessary to have a good market. You gentlemen know that we all have had experience with the commission man, and we have said that we got little return from him. To a great extent this

has been the fault of the fruit grower because it has been the custom to pack the fruit in barrels; a man comes along and we let him have the fruit at just about what he chooses to give for it, or give the fruit to be sold in the fall when apples are plentiful and bring a low price. I do not say that the commission man does wrong but I say the farmer does wrong in not hunting a market. There are about eight hundred farmers who ship their fruit to our market, and after it is placed in storage they watch the market, and when it reaches that stage that they think they can sell for a profit they come to Philadelphia, usually distribute a few barrels to our commission men and those commission men that can get the best price get their fruit, and in that case they sell directly to the commission men. Usually a commission man is satisfied to buy from a good fruit grower if the fruit grower puts his fruit in cold storage because he knows that that man will be more careful in packing his fruit, and if he can make ten per cent. on his investment that satisfies him. That is one thing we are trying to do in Philadelphia. We are trying to bring the fruit grower as near the consumer as it is possible to do and the nearer the farmer gets to the consumer the more money there is in the business.

In considering the best apples to be refrigerated one must not only consider the variety and quality of the apple, but the temperature, humidity and care of the fruit after it is placed in cold storage. While we refrigerate fruit from nearly every state in the Union, we believe that each location and climate is adapted to a certain variety of fruit. For instance, an apple which thrives well in New York may not do well in Pennsylvania, or one which is raised in Delaware may not do well in this State; therefore it is best for each individual to ascertain what variety of fruit is best adapted to his locality. On that account it is impossible for me or any other man to tell you because there are a great many apples of different varieties raised in the United States, and, as I say, nearly every state has an apple that is best adapted to that locality, and while we store apples from nearly every state I do not think it would be safe for me to say to you what apple is best for storage any more than it would be safe for me to say to you, you should use oil, or lime and sulphur, for the spraying of your trees, from the fact that you might use both with profit.

In giving an opinion, and it is only my opinion, after years of close study and observation, the following apples at the present time are some of the best to be considered as they are good keepers, prolific bearers and bring a good price in our market: The Baldwin, the Stayman, Rome Beauty, Nickajack and Wine Sap. The Baldwin is considered one of the standard American apples and a long keeper. The Stayman is comparatively a new apple, is large, fine flavored, good cooking and table apple, prolific grower, good color, and is one of the highest priced apples in our market. The Rome Beauty is a well shaped apple, even in size, good color, fine eating and cooking apple and good keeper. The Nickajack is a dark red apple, a long keeper, and sells well. The Jonathan apple which is a well colored apple, not very large but of fine flavor, sold from four to six dollars a barrel up until Christmas. As there are not many orchards of these apples the supply is soon exhausted.

There is another apple worthy of mention, and which is too little

grown, and that is the Nero; that is what we call the Four Hundred apple from the simple fact that the wealthiest people in Philadelphia seem to take this apple for the table. It is not very sour, but a good eating apple, and looks well, sells well, and the supply does not equal the demand.

When refrigeration was first started we knew very little about it, especially the temperature required for the different fruits, and I must say, after twenty odd years of experience in the refrigeration of nearly all kinds of fruits, it seems to me that we know very little about the nature of the apple so far as refrigeration goes at the present day; the same as you, gentlemen, every day learning something new and improving the different methods of culture, marketing and selling of your fruit, so there is always something new to learn about refrigeration; but all these things are advancing very rapidly, and I have no doubt, in a few years from now, if you should take a photograph of the fruit you see here to-day (which surpasses in all respects the fruit of a few years ago), you will marvel at your poor results for I believe the time is coming when you will have more perfect fruit. The land in this section is well adapted for the raising of the highest grade of apples and other fruits and there is no reason why you should not have as fine fruit as anywhere else.

I want to say something about the Western fruit. It has been said it did not pay to plant orchards here from the fact that they are planting so many in the West. I have traveled through the West considerably and I don't think the western people have sufficient apples for their own consumption. For the last two years they have been buying apples in Pennsylvania, New York and Virginia, and have shipped them to Chicago, Cleveland and other Western cities for cold storage; therefore that demonstrates that there is no danger of having too many fruit trees planted in this State.

A gentleman came to my office a few weeks ago who to my knowledge has a hundred trees, bearing fruit about four years. I said to him: "What did you make out of your trees last year?" He said he had eighteen hundred dollars profit from those hundred trees and he was offered more this year for those apples. He was not a man you would call a scientific man but a practical fruit grower.

I believe if the young men of this vicinity and other sections of this State would take these farms and put out apple trees, and put out a good lot of them, properly cultivate and care for them, there is nothing they could get into or do that would bring them better returns than a good orchard. There are very few men who go into the cities that make a success of it; about one in five hundred makes a fortune. In planting these orchards they could make a good living in the country and store up a good sum for old age.

When refrigeration was in its infancy the temperature for apples was not thoroughly understood, and ranged about 26 to 40 degrees, but at the present time they are kept at between 30 to 32 degrees. It is absolutely necessary to have an even temperature and not allow it to vary more than two degrees after the fruit has once become cool. It is also very essential to have the room well ventilated occasionally; otherwise by the close atmosphere in the rooms the flavor of the apple is liable to be lost.

We keep the Keiffer pear sometimes at 30 degrees. You will understand that in a room that is very close, and no circulation of air, the freezing temperature of the air is about two degrees higher than it is out of doors. At first we kept apples at 38 to 40 degrees, as I have said, and butter was kept at the same temperature. I mean to say when artifical refrigeration came into existence. I do not mean a room kept cool by ice and salt. At the present time butter is kept from zero to five degrees below and eggs are kept at from 30 to 32 degrees. If you go in a restaurant in any large city and order ham and eggs you usually get refrigerator eggs, and they are much better than those eggs you buy in the stores. I had a Bartlett pear here with me; that pear was kept at from 30 to 32 degrees. We wanted to see how cold we could keep that pear without it being frosted. If you put frost into a Keiffer pear or Bartlett pear, or any pear, you will ruin it. You can freeze an apple and if you hold it at that temperature a certain time, take it out of the refrigerator and place it at about 40 degrees, keep it there about 24 hours, that apple is not injured, apparently. It will not keep as long as it would if it had not been frosted but it will not injure it for a few days.

I suppose I should not speak on any subject than apples, but as you gentlemen have had some liberty on other things I will say a word on the Keiffer pear. The Keiffer pear, some 13 or 14 years ago, when I came to Philadelphia, was condemned by nearly every one that raised them, and the refrigerator men were equally opposed to them, and thousands of trees went out of existence on account of everybody giving the fruit a bad name. We had a few men store their pears with the understanding that if they could not get out with their freight we would not charge them anything for storage. At first we had them at 38 degrees, and when they came out they came out with a black heart. We discovered that they were too ripe when put in storage, were not put in storage early enough, and after a while we run the temperature down to about 30 degrees and found they would keep very well. We also discovered that they would shake the fruit from the trees and in falling from the trees would be slightly bruised, which would cause decay, therefore hurting the Keiffer pear very materially as far as marketing them was concerned. At the present time, however, I suppose we store from thirty-five to forty thousand packages of the Keiffer pear during the year, from half a barrel to a barrel, nearly hand picked, and as Mr. Hale said about picking other fruit, they make three pickings. They pick the large fruit first, before they are over-ripe, send them away to cold storage, and gradually get the whole crop stored away.

Last year was a good year for any man who had apples to store away, or almost any fruit, and this year is equally as good as far as the pear goes. A large lot of apples have been on the market and prices have been very low for poor fruit, but a number one fruit will bring nearly as much in our market now as it did last year at this time. The Keiffer pear was brought into the market and shipped to the West. They sold from 15 to 20 cents a basket. One gentleman hauled his pears to the depot in the fall and got 20 cents a basket for them, and the party he sold them to received day before yesterday, $1.10 a basket for them, F. O. B., Philadelphia.

after being in cold storage three months. Some of our apples were sold this fall for $2.00 a barrel, and last week some of those apples put into cold storage, from the same orchard, sold for $5.00 a barrel. This is one among the many experiences that come up every day, and I have often wondered why you gentlemen who raise good fruit, and you raise it to make a few dollars, do not take more interest in putting it away and holding it so you can realize several hundred per cent. more for it by keeping it a few months longer.

I extend an invitation to you, if any of you come to Philadelphia, to come to the Reading Terminal Cold Storage Plant and I will gladly show you the method by which we successfully keep fruit, and dispose of it, and I will be glad to give you any other information on the subject and do anything I can to help you make money.

I thank you for your kind attention.

CO-OPERATIVE MARKETING OF FRUITS AND EXPORT TRADE POSSIBILITIES.

By A. W. FULTON, Managing Editor, *American Agriculturist*, New York City.

MR. FULTON.—Mr. President, Ladies and Gentlemen: It has been well said that the business end of fruit growing is in the market, and I would be very foolish if I thought I could give any advice to these practical fruit growers who have met here to-day, but I have taken a great deal of pains to ascertain the various questions which arise concerning the marketing of fruit. I will try to confine myself closely to the figures, and try to avoid going outside of the subject. With that end in view, I have written my thoughts down in a paper.

I need not tell you that fresh fruit is handled in two ways, individually and on the co-operative system. These two general plans comprehend most of the distribution, no matter in what part of the country the fruit is grown, nor how it eventually reaches the consumer. Within the limits of this brief paper I shall touch but lightly upon the individual sale of the grower's crop of apples or berries, as in this conditions vary as far as the east is from the west. Instead, I propose to rapidly bring before you what is actually being done by a number of successful associations marketing fruit on the co-operative plan. Then finally a few words on the export possibilities in certain of our splendid fruits.

Your association represents the highly important fruit interests of the great State of Pennsylvania, and I want to say right here that the possibilities of commercial orcharding in these hills and valleys has been by no means measured. For many years I have given close and personal attention to the wholesale fruit markets in the eastern cities, and have from time to time been confronted with a statement made by some commission merchant or wholesale dealer, that Pennsylvania does not cut so much of a figure in the big apple markets as one might expect; far less, for example, than

western New York or Michigan or possibly Missouri. When asking why, the reply is given me that Pennsylvania grows enormous quantities of apples, but not in the systematic manner in vogue in the territory adjacent to Niagara Falls, or some of the southern counties of Michigan, or in the southwest. There, an operator may go into an orchard before harvest, and buy an entire block of 10, 20 or 40 acres of Baldwin apples, or Greenings, or Spys; or if in the southwest, the much berated leather-skinned Ben Davis. But if this same operator with apple storage facilities comes into Pennsylvania, it is difficult for him to find an orchard of a given variety of standard sort, running clean, even in size, and free from blemish. Were he to buy an orchard he would be obliged to take apples of a dozen or twenty varieties and this means lack of the uniformity which the large operator seeks. But I am constrained to believe that with the impression being made upon our Pennsylvania fruit growers in recent years by just such organizations as this, together with the excellent work by the experiment station and other educational enterprises, permanent good is being done toward placing Pennsylvania, with its large aggregate output of apples, mentioning that fruit for the moment, nearer the front rank in commercial orcharding.

Last year I had occasion to make very thorough research in all parts of the country into the subject of co-operative marketing of fruits. Among the interesting things I learned was that this valuable avenue of distribution is only in the beginning of its usefulness. Here and there highly successful fruit marketing associations are conducted. In other places the work is in a formative stage, while very largely this phase of the business is still something entirely of the future. Through my investigations at that time, and through the most recent confirmation of conditions, I am inclined to believe that co-operative marketing is more observed (and perhaps more successful) in small fruits, particularly strawberries and grapes than in tree fruits. I am not now alluding to the great co-operative associations on the Pacific Coast, which are in a way a class by themselves. In the western apple producing sections east of the Rocky Mountains, the movement for co-operative marketing is in somewhat the same condition as here in the east; some fairly successful organizations, but as a rule, apples handled independently.

In apple orcharding there are many things in favor of inducing buyers to personally visit the orchard at time of harvest or just before in order to secure the best prices, this fruit being of less perishable nature than berries, for example. In fact, both West and East, there is a very strong drift among successful orchardists, to sell their apples on the tree, or barreled, as the case may be, at home rather than through consignee or a commission merchant, to say nothing of any attempt to handle the apples on the co-operative plan. A highly successful apple grower in Illinois once gave me this testimonial expressed in a single paragraph: "I have tried to find out how to get the best market results; I have consigned apples to various commission houses and this method cost me thousands of dollars owing to unsatisfactory returns. I have sold apples to be paid for on arrival, and this is as bad, as the commission house is liable to turn down the car of fruit on arrival, provided the mar-

ket is a little off, and wire that the car has arrived out of condition and subject to my order. The rejected car is then turned over to some other house which, of course, has a good excuse for slaughtering this rejected fruit, and then I may be called upon to pay freight and other incidental expenses. I consider the most satisfactory way for the producer is to sell his apples at home, either in bulk in orchard or by the barrel, packed and settled for on the spot."

It does not necessarily follow that this successful orchardist's experience is the best for all to observe; conditions may vary as to location. But right here comes in the absolute necessity of fruit growers keeping posted on crop prospects, as the season moves on from month to month; and on market conditions in order that they may sell the fruit independently at the right time, and get for it all the market will stand. Growers who are not in favor of consigning apples claim that the man who does consign is practically obliged to "hold the bag" all the time. He takes all the risk and worry and also stands the cost of growing, picking and shipping, with the result that if anybody gets hurt in the deal it is in this instance the producer. In a word I have been unable to find any positive evidence of abundant success in the co-operative sale of apples, although in the Southwest there are developments along this line. Pears and quinces may be properly placed in this same class, while peaches and cherries should be regarded in much the same light as quickly perishable fruits along with berries.

Bearing upon this whole subject of marketing fruits, it is worth while to note that in some of the New England states commercial apple growers are becoming greatly interested in the Canadian Fruit Market Act. This is, no doubt, familiar to some of you. In brief, it is a stringent law regulating what shall and what shall not go into a barrel bearing a certain brand. In a sense, it is the legislature coming into the deal, and forcing the orchardist to be honest in packing, grading and marketing his apples. The theory is that it will eventually prove for the greatest good of the greatest number, producers included; that action which tends to place on the consuming markets fruit in better condition will tend to greatly increase its use and must benefit both consumer and producer.

The Canadian law provides substantially for two grades of apples, No. 1 and No. 2. Amendments which went into effect last July placed Canadian No. 1 grade somewhat higher than formerly, and really means that every apple in a No. 1 package must be practically perfect. A 10 per cent. allowance is presumed to cover only such defects as could not readily be detected by a fairly careful packer. The standard market grade in Canada under this law is in reality the No. 2. Such package will contain apples 80 per cent. of which are free from any defects that will cause material waste. The No. 3 is not defined by the law, but is provided for the purpose of meeting the needs of any marketable apples that may not qualify for the higher grades. Each box or number intended for sale must be plainly labelled in conformity to the law before fruit is taken from the premises where packed. There must be the full name and address of the individual or corporation, name of the variety, and a distinction of the grade, and no one must sell fruit or offer it for sale unless the package is thus properly marked. Violators of

the law are subject to sharp fines and imprisonment and inspectors have close oversight in the enforcement of the law.

Commercial orchardists in Western New York, competing with Ontario growers in the export markets, are watching with the keenest interest the working out of this Canadian Fruit Marks Act. At last winter's meeting of the Massachusetts Fruit Growers Association a strong appeal was made by a representative of the Maine Pomological Society, asking that apple interests in the two states seek to promote state legislation closely akin to the Canadian law, but it is worth passing note that at the Maine meeting the past fall the thought was there expressed that it is a little early to force such legislation, even though it may be ultimately a wise move.

As to the standard apple package, I have been told both at home, and when personally visiting the London and Liverpool markets, that dealers, except in a restricted way, do not want anything but the barrel in handling this fruit. Foreign buyers of American and Canadian apples as well as those in the domestic trade are all a unit in expressing the hope that growers will each season improve in the matter of picking and packing. As a rule, they want a barrel of regulation size, the flour barrel or its equivalent. This, of course, holds rather less than the three bushel barrel advocated in a few sections. One of the best posted men identified with the International Apple Shippers Association made this statement to me, that apples packed in a good flour barrel will bring as much money in any market in the world as if in an absolutely new barrel. But in these days of advancing prices, it is sometimes a toss-up in the matter of cost between a good second-hand barrel and one just made from new stock.

Some of the most notable successes are in the co-operative marketing of small fruits and vegetables; and the organization, local in character and capable of adaptation in some form by Pennsylvania growers, forms an object lesson worth our attention. For example, a successful association of this character has long done business, with Cobden, Ill., its center of operations in fruits and truck. This is a regularly incorporated shipping association; the manager makes it his business to make contracts with the transportation companies, and to secure the number and kind of cars required by shippers and at the time required. In cold weather, for shipping sweet potatoes, the cars required in the daily supply are placed on side tracks ready to receive the barrels. In summer, when iced cars are needed for shipping such perishable stuff as strawberries, the manager procures the cars, and has them properly supplied with ice ready for immediate use. He collects information daily about the markets and prices, receives fruit at the cars, receipting to the owner for the same, sees to it that the fruit is placed properly in the car, makes a manifest for each owner, and bills the car to the proper person at its destination. In this way the best rates and services are secured. The cars are shipped from one person in the producing section to one person in the distributing market, and takes away entirely from the railroad the important work of loading and unloading. During the fruit season, 15 to 20 cars are shipped daily from Cobden, representing, of course, many thousands of packages

and securing to the individual grower a degree of uniformity in handling, which in the long run, proves profitable to him.

One of the largest co-operative enterprises of this character in the United States is the Ozark Fruit Growers' Association, with head office at Fayetteville, Ark. The management has placed the stock at $1 shares in the hands of as many growers as possible, this creating a nucleus for working capital. In this territory, comprising chiefly the two Arkansas counties of Washington and Benton, fruit interests are very important, not only apples but peaches, strawberries, etc. Through the efforts of the association some reduction was secured in refrigeration charges, and more prompt railway service was also secured. Shipments have been heavy in several seasons, and the association has proved a profitable thing for the growers. At the height of the shipping season representatives were sent to the larger markets to keep oversight and report on cars of fruit shipped. The outlay for so large an organization is necessarily heavy, this including traveling expenses, office force, telegraphing, postage, etc. All these expenses are met by a three per cent. rebate from consignments, and no assessments on members are needed. This association, operating in such an exclusively fruit section, can scarcely be compared with what may be done in a smaller way in our more scattered fruit sections, yet it is inspiring to know that the organization named has been the means of saving its members, the actual growers, substantial sums which formerly have gone into the hands of the middlemen.

A successful co-operative association, now just two years old, is the Wathena Fruit Growers' Association of Kansas, starting with 12 members, now having a hundred. During the past season this association marketed $12,000 worth of strawberries, $35,000 worth of raspberries and blackberries, 56 cars of apples, and a sprinkling of peaches, at a reasonable profit to the producers. Grapes, peaches and apples were sold in carlots, with shipments east and west, and the small fruits mostly shipped by express, to various states. The officers of this live association are all fruit growers, operating their own farms. The business manager writes me under recent date: "Our association has been very beneficial not only to the members, but also to fruit growers of this vicinity, as we have succeeded in maintaining a much better average of prices than in former years. We also buy our crates, material, baskets and barrels in lots of eight to ten carloads, and pay cash for same, averaging splendid savings to the growers. We permit all responsible houses to compete for the business, and by so doing save a good deal of money on our supplies."

One of the really successful organizations for the co-operative sale of small fruits is the Neosho Fruit Growers and Shippers' Association operating from Neosho, Mo., which is quite a center, particularly for strawberries. This truly local association, something which might be readily duplicated in many localities here in our eastern fruit sections, has carried on its business long enough to have passed the experimental stage, and is favorably known in other states outside the confines of Missouri. The farmers making up the association grow some cane fruits, and have also shipped some plums, cherries, peaches and apples, but confines its business mostly to strawberries.

In a word, this association is essentially for growing and shipping strawberries on an extensive scale. There are 140 members in the association, and they grow a total of 800 acres of strawberries. Last season they shipped 70 carloads, the year before 105. Frost reduced the last crop materially as here indicated. Shipments are made from Neosho to Kansas City, St. Joseph, Topeka, as far west as Denver, as far north as St. Paul, and as far east as Detroit. The association consigns to reliable and responsible commission merchants in these various cities. The fruit is never sold on track. In a recent letter from President J. B. Graves of this association he informs me that with the kind of berries his association grows, and with the excellent care taken in packing, he finds better results with commission merchants than with track buyers.

Now very briefly as to the by-laws of this association. The membership fee is $1, annual dues $1, and when growers in the association ship berries as a firm or company, each individual member of the firm must become a member of the association. The usual officers are elected annually in August, president, vice-president, recording secretary, treasurer, also chaplain, and a business committee consisting of five members. The secretary keeps all records, collects all moneys due the association for dues, fees, fines and forfeitures, turns this over to the treasurer monthly, taking the latter's receipt therefor, thus constituting a bookkeeping account for the work of the auditor. The secretary is under bonds of $400, and the bond is kept by the president. The secretary receives $25 per year for his services. The treasurer is under bonds of $1,000, and he also receives $25 annually for his services. He handles the money of the association, paying out on proper warrants which are to be signed by the president and secretary.

So much for the ordinary bookkeeping of the association. Now for the most important part of this management, which rests in the business committee, which it will be recalled consists of five selected members of the association. After election these organize, naming one of their number chairman. This committee is practically responsible for the success or failure of the years business as an association. Each member receives $2 for each meeting which he attends. This business committee elects one of its number as secretary and treasurer of the business committee, and this man is really business manager and corresponding secretary. Naturally, the best man in the association is none too good for this. He is to keep a full record of all transactions of the committee, and attend to all the correspondence of the association. He receives all cash returns and rebates from commission merchants, and from other sources, and makes disposition of same as directed by the rules of the association.

The manager and his assistant are in full control of the loading sheds. The business committee pays all the expenses of the association such as just indicated out of the rebates in commission charges, etc., and 25 per cent. of the remainder they also pay to the treasurer of the association to hold. They also pay over to each grower his proportionate part of the returns after the cost of handling is deducted. The business committee each season selects the commission merchants who are to handle the berries of the association. A most important proviso is that every member of the association

obligates himself to turn over all the berries to the business committee to be shipped by them except those he may need for home requirements. In no case can a member sell berries for shipment unless he first obtains consent of the business committee. Infraction of this stern rule is dismissal from the association. Stress is laid upon the great importance that the growers deliver all fruit to the management, so that commission houses arranged with may not be disappointed by reason of failing to get accepted consignments. Each grower must be ready to deliver at the shipping sheds all berries he has to ship, each day, not later than 10 o'clock P. M. There are two grades of strawberries designated—A and B. The A must be strictly choice, firm, sound stock of good size. The B grade must also be firm and sound, but may be somewhat smaller. Fruit too soft for this grade will be rejected. After inspection at shipping sheds berries that grade A have the grades stamped on both ends of package with the association's trade mark.

It will be recalled that all the berries going to Kansas City, for example, are shipped to a selected commission concern handling the business. Each grower having fruit in that shipment shall receive an average price per crate of each grade each day. When it is necessary to hold berries over from one day to the next in the city market, the average of the two days is the rule. In receiving the fruit at the loading shed the grower is given a receipt showing how many crates he had on that particular load, how many A and how many B. The fruit is perhaps sent to several markets the same day, according to market conditions, as understood by the manager. As just noted the grower receives for each grade the average of the sales for that day. It is known how many grades were shipped each day, and thus is known almost immediately what the fruit netted the growers. Settlement is made on the basis of the average.

All growers delegate themselves to be governed by the decision of the association in regard to prices to be paid for picking berries, and they agree that they will not pay more than the fixed rate. If they do they are thrown out of the association. The business committee makes arrangements with the railroads for cars and for securing the lowest possible rates, for the refrigerators, with the express company for service and rates, and for other necessary service. They make arrangements with commission merchants before the shipping season opens and know definitely who will handle the product. In investigating the city commission merchant, they find out not only that he is honest, but also that he is capable and active. Then they stick to him as long as he does the right thing by the association. The business committee buys the box and package material for distribution to the growers at cost, getting it early at reduced rates in carloads. They supply stamping outfits, tally sheets, rules for pickers and packers, etc., and appoint inspectors for cultural work in the field, and for packing and grading. Full advantage is taken of any possible competition between transportation companies. Very little is sent by express as charges are too high. Instead refrigerator freight service is used.

A point about this successful co-operative association is that they stick together, that they have strict rules, that they enforce them. that they buy together at lowest cost, that they sell well-grown, well selected and well packed fruit at highest prices, and at lowest

cost in the way of transportation charges and commissions. It is the application of business principles in growing and marketing strawberries with exactly the same features brought to bear that may be discerned in the manufacture and sale of shoes. Last season one grower in that association sold $1,000 worth of berries from three acres. Another picked 210 crates per acre from his plantation of three acres, which sold at an average of $1.73 per crate.

Coming nearer home, let us note briefly what is being done in the middle south. The Peninsula produce exchange of Maryland, with headquarters at Pocomoke City, was organized three seasons ago for the purpose of buying and selling and handling produce. It is, in fact, a producers' agency for marketing potatoes, peaches, berries and melons. It has the usual complement of officers, general manager, etc. Much emphasis is placed on having the goods well packed and true to classification as to grade and quality. Each shipper is charged 5 per cent. for all goods sold outright at shipping station, and 8 per cent. when shipped on consignment to the commission merchant representing the exchange. The latter guarantees the payment of all goods consigned or sold. The treasurer makes draft for some through the main office. The work of the exchange is satisfactory to its members as a whole. Shipments of sweet potatoes have greatly increased in recent years. The grading is being improved and the exchange insists on sending out packages of standard size and a grading that meets the approbation of buyers and consumers. A large part of the goods are eventually handled by commission merchants in the big cities, yet it may be noted that the exchange seems to favor selling F. O. B. shipping points at many of these stations.

In actual working a member of this peninsula produce exchange packs his melons, for example, according to the instructions, and on arrival at the shipping point delivers them to the exchange inspector, if business at that particular loading station justifies the employment of an inspector and also an agent. Otherwise, the melons are delivered to the representative of the exchange who acts in both capacities. The goods are then properly branded and loaded in cars, if shipments are sufficiently large, and sold at once, at an agreed price, F. O. B., loading point, or consigned as the agent thinks best. For this service the exchange proper receives 5 per cent. which goes to defray the running expenses of the association, the surplus being eventually paid back to the stockholders at the end of each season. The growers and shippers constitute the stockholders. The general office has telephone connections with the several shipping points and is in touch with its representatives at any time of the day. If a shipper requests that his goods be sent to New York or Boston on consignment, this course is followed. In most instances, however, the grower prefers to turn the goods over to the exchange to be handled to the best possible advantage.

Another success of this character is the Eastern Shore of Virginia Produce Exchange, operating in the counties of Northampton and Accomac on the Chesapeake Peninsula.

This has been in successful operation for six years or more, and at its last annual meeting held in December, it was stated that during the season of 1906 the exchange handled 1,083,000 packages of truck, mostly white and sweet potatoes. The volume of business

passing through the office amounted to $1,411,000. A successful year was reported and a handsome dividend declared on the share capital. This co-operative company operates at forty shipping points, ships all under registered trade mark and the business is handled in a thoroughly up-to-date manner. A general manager is the responsible agent for the buying and shipping. He advises local agents to whom they are to consign their produce. He sends them every morning or oftener, if necessary, the various market quotations. He must also see that the goods are properly inspected, and keep a careful record of the number of packages shipped daily. City commission merchants who are in arrears for 20 days in the settlement of accounts receive no further shipments until the settlement is made in a satisfactory manner. The general manager visits the local shipping points once a month or oftener. In the local exchange the appointed officers are responsible for the storage in packing houses, and make daily reports to the general manager. Where the produce is consigned by the exchange, the local agent mails to the consignee an invoice of number of barrels or packages, together with the names of persons who have furnished it, and the number of packages each person has in the consignment. The consignee makes separate cash returns to each person, first deducting 5 per cent. This is sent to the treasurer of the exchange, with a full statement as to the source from which it comes. This accumulating fund is, of course, handled eventually as the stockholders desire, either in the way of improving the equipment after expenses are paid or in dividends, etc. The local exchanges have proper representation on the board of directors of the exchange. Great care is taken in packing and shipping, with special trade marks which stand for something, on selected lots. This farmers' organization handles in a season 3,000 to 4,000 cars of sweet and white potatoes. In 1905 and 1906 it cost less than 5 cents a package in association expenses to handle the crop.

Growers of cauliflower in an important trucking section on Long Island formed an organization several years ago for marketing their crops, and have succeeded reasonably well. Last season was excessively wet during July and August, and the crop was badly damaged, cutting down the business temporarily. Yet during the shipping season, nearly 66,000 packages were handled, and to the general satisfaction of shippers and receivers. In a good season as high as 130,000 barrels of cauliflower are handled by this association, mostly on the New York market. The managers closely watch conditions, and the moment the New York and Philadelphia market is over supplied, the surplus is promptly shipped to other cities. Cauliflower shipped to points outside those named were bought outright from the farmers by the association, and distributed as far west as Chicago. The association now has 400 members, and pays its manager $1,000 a year salary. Great savings are effected in the purchase of supplies and the utilization of refrigerator cars, etc.

Reverting for the moment to the possibility of enlarging the market outlet for apples, I want to call your attention to what is really an encouraging phase of commercial orcharding. I refer to the business of evaporating apples. As all of you know, this has in recent years grown to a large industry, centered perhaps in a few counties in Western New York, but also of considerable prominence

in Michigan and the Southwest. Within the past few days I have taken pains to further investigate the situation, with a view of throwing some light on the probabilities of profitably increasing the output of evaporated apples. Inquiry made among some of the most prominent dealers in the New York City Market bring out the highly encouraging opinion that the business is not overdone, and that within reasonable limitations it may be increased considerably, and still leave a margin of profit to all engaged in it.

This is apparently to come through the further building up of the export trade. Evaporated apples are very popular in the domestic markets, and the consumption is large, yet certain facts bear directly on this business in the way of limiting the quantity which producers can reasonably expect to market at home. Reference is made, for example, to the development of cold storage throughout the country, so that ripe barreled fruit is much better distributed and taken care of than formerly. Furthermore, the domestic demand is perhaps not increasing so rapidly as might be wished, for the reason that fine California dried fruits, prunes, peaches, apricots, etc., are very largely used as a substitute.

But the wider outlet is to come from the foreign demand. We export in some years as much as 50,000,000 pounds of dried apples, mostly evaporated. The opinion of those closely identified with the trade almost without exception points to the possibility of further extending the business in foreign countries, particularly northern Europe where evaporated apples are very popular. It depends very largely upon the price of the finished product. If foreigners can buy evaporated apples at 5 1-2 to 6 1-2 cents per pound in a wholesale way, they are prepared to take large quantities, but when the figures go to 7 cents and above, the movement is more restricted. Ocean freights are low and favorable, and our fruit is very popular abroad. The business is thoroughly established as to curing, grading, packing and shipping, and with the friendly attitude of both exporters and foreign buyers there is every assurance that the outlet will be permanently large, and is capable of further material expansion.

Now for the practical application to the Pennsylvania fruit grower. It would be ill advised for the orchardist without adequate knowledge or equipment to go into this business of evaporating apples; but it is well worth careful consideration as a means of disposing of at least a part of the surplus crop, particularly in full years. An evaporating plant is not expensive, comparatively speaking; there are possibilities of co-operative work in thus handling the fruit, or small stock companies might be formed to establish and operate a plant, with, of course, the prerequisite that this is well managed from its inception. There would also seem to be room for the individual grower under proper environment, as has been proved in many instances in Western New York. When apples are scarce, many of the larger evaporators cannot get raw material at prices to justify operating them, and this leaves the business to some extent in the hands of individual farmers and fruit growers, who thus utilize from their own supplies considerable quantities of low grade fruit. Evaporated stock outsells the sun dried a cent or two a pound, in average seasons, and in some years more. One argument which has been advanced why general good would come from a far wider extension of small evaporators is the way in which this might

hold speculators in check. As it is now, there is much manipulation, engineered by some of the larger concerns identified with evaporating plants and the few firms engaged in the export trade. The opinion has been expressed that if the number of small evaporators is materially increased, this very fact will tend to take control of the business from a few hands, and put it into many, thus helping the industry in a large way.

An evaporator with a capacity of 100 bushels of apples a day costs somewhat less than $1,000, and should turn off 500 to 600 pounds evaporated apples from 100 bushels of green stock, together with 200 pounds of skins and cores.

The federal pure food law which has just gone into effect is puzzling dealers somewhat, owing to the fact that evaporated apples are treated with sulphur fumes in order to bleach them, and there is much interest over the question of ruling which may be made; yet no doubt the matter will be amicably adjusted. The business in evaporated apples, in a word, is not overdone, nor does it seem probable it will be in the immediate years to come, and wisely handled ought to be the means of disposing of an increasing proportion of our annual apple supply.

No business will run itself, a co-operative fruit selling organization any more than a woolen mill or a trunk line railroad. Many co-operative enterprises, at one time prosperous and full of continued promise, have fallen by the wayside through bad management. This may include lack of a strong man at the head of the business in distributing and selling products, and lack of a thorough understanding of market conditions in the big trade centers, and sometimes a lack of firmness in maintaining a high standard of excellence in quality of fruit and in packing. Long credits proved, among other things, the death of one very successful co-operative fruit shipping association located in New Jersey. Summing up the situation, the problem before every fruit grower, as each season rolls around, is to sell his produce in the most advantageous manner, either single handed or co-operative.

Some of the thoughts outlined in this paper may be summarized, with deductions therefrom, embodied in a couple of concluding paragraphs.

If a number of growers in one town would work together in some such way, as the thoughts in this paper suggest, they might combine in shipping, and thus give co-operative marketing a practical test right here in Pennsylvania. Study thoroughly the co-operative movement as it has been developed, and reasonably perfected in other sections. See what can be done, or what application can be made of these various successes to conditions in your own locality.

A great essential right here is a thorough knowledge on the part of producers of market conditions; not only at your own town and shipping station, but in the big distributing centers at home and abroad, something of the export trade, something of domestic requirements in various cities, something of the temper of dealers who buy in the autumn for later markets, etc. One thing necessary is to know the market to which you ship, when, and how to ship. One large commercial center will take with avidity certain apples or certain peaches which would meet slow sale in another big dis-

tributing center. Certain varieties of apples are quick sellers in Philadelphia, but would meet indifferent reception in New York.

Special emphasis should be placed on the grading, packing and handling of your fruit. Appearance often sells it. Mark a No. 1 apple No. 1, with your name, and make it stand for something. If you must barrel inferior fruit, have the courage to pack No. 2s as 2s, and so brand them. Remember in this connection that it costs just as much for the empty barrel; it costs just as much to pack and ship seconds as first. You will not make a fortune the first year, nor probably in the second. But persistence in some such course will eventually count for much, to your permanent profit, whether you sell independently, or co-operatively; whether you cater to the local wants of your home county seat, or a distant mining or manufacturing center, or whether you plan to place your fruit in the large city markets.

THE PRESIDENT.—I am very sorry we have had so small an audience to hear this valuable paper. The marketing of fruits is one of the weak points.

MR. YOUNGS.—Over on the shores of Lake Erie we have a co-operative fruit growers association; that is, a co-operative crop growers association. It is a large undertaking, but the great belt of crop growers belong to that association. Of course, there are some houses there who maintain agents all through the season. There are from seven to ten thousand carloads of crops shipped in our town.

MR. HALE.—I have been very much interested in this paper, and believe in the co-operative associations among the growers of anything in the soil, for I have worked with them for the last thirty years. The gentleman in this most excellent paper covers a few of the western associations, and shows that they have been most successful. There is one instance that I know of where they gave the secretary twenty-five dollars a year. Farmers are never willing to pay like other commercial people, who are willing to pay for services—for their help. Every co-operative association we have had in this country, has tried to run it so cheap that it has run itself into the ground in a very short time, I am told. I don't want to reflect any upon anyone, or to name anyone tonight, but I have been in contact with some of the commission men, the first class men, who tell me that they get very little from the association because you have to graft some of its officers. That information I have had in the last two years from some of the best commission men, that you cannot get the fruit from them because you have to graft the officers. I hope the reporter will not put that down because it will hit some one. So much for that in a general way. But it don't work out somehow with the man owning only a bit of land; he does not want to co-operate with anyone.

The suggestion brought out by the paper in relation to the Canadian fruit market, and our friends in Maine waiting and going to consider it in another year, when legislation is obtained, comes to my mind. Mr. President, and brother fruit growers, ought we not to be ashamed that we don't know how to do it without having legis-

lation; to show us how to pack our products and crate them? What would the manufacturers in New England think of that? Meet together and talk about the government under which they live to specify how they should crate and pack their products. It is a reflection on our business methods, and good horse sense, should tell us we must pack them honestly and pack them right, if we are going to make them pay. I hope every good man will put his foot down on the man who talks about legislation to tell us how we are going to crate our products. Brother Brown, said those apples must be "Axx." Make your number ones perfect, and if you have anything below that, call them seconds and thirds. Perhaps I am talking heresy here, and perhaps it is not the place to talk it. I will tell you a little story along that line. Down south the colored people want to attend churches; the churches are plain and simple, but a colored woman coming to one of our northern churches, and noticing the stained glass after she entered the church, expressed her gratification by saying, "Lawd to Gawd; Lawd to Gawd, I'm glad I'm in this church," and one of the of the ushers went to her and said, "You must be quiet." Pretty soon the organ broke out in peals of splendid music, and she said, "Glory to Gawd, I'se glad I'm here; I'se glad I got religion," and the usher came again, and said, "You must get out of this; this church is no place to get religion." I want to get the religion of honest packages and stamp on them our own name and reputation, by putting on our labels and crates our own names, and impress the market in that way.

Now another subject which was of great interest to me was the remarks made by the gentleman from the Reading Terminal. I have heard for a good many years that Brother McKay, was one of the best cold storage men in America, and that he tried to make a success of it. He tried to fool us in the statement, when he got on the platform, when he said he was not a speechmaker, and for awhile I was going to go along with him, but by and by he went along in that smooth way and I found I was mistaken, and I want to say right here that is the slickest way to get at it, and he got there. Of course, he was not near as slick a talker as Brother Brown. Why did Brother Mcay get there? He is really an old philosopher. In talking he had the sound philosophy of it; the sound philosophy of the handling of the products of the market. He said that as soon as you took your fruit in there, he knocked a head in the barrel because he wanted to know what you are putting in there, and because it will bring better prices if it is honestly packed with care. He said, if you don't know anything about your goods, send them in there, and I will store them, and if they don't sell out and make a profit, I will not charge you anything. The man who has no faith in his soil, and his plants, or in his business, cannot succeed, and the man who wants to have the government tell him how to do business had better get out of business.

I think now that it is pretty near good night. I have talked more than I ought to, but I am glad to be with you. I was told a few years ago that when I would come to Pennsylvania to attend the association meetings, I would find a few old sod pots who patted themselves on the back, but I found a good many good men in it, and that my informant was very much mistaken, and I am glad to find so many young men in it. I know these young men will have greater

opportunities on the farm than there is any other industry. Stick to your farm, and you will have the best kind of fun it it. The next time you come here bring your best girl and bring the other fellows's girl along, and we will have a rousing old meeting; a much better meeting than this time.

MR. YOUNGS.—Our association pays the man at the head of the co-operative association twelve hundred dollars, and his assistant, five hundred dollars, for six months, and pays stenographers. We don't expect something for nothing, because we know we won't get it.

MR. BROWN.—The failure of one Fruit Exchange in Delaware, was because they would not submit to an inspection of their fruit; that was the cause of the Delaware Fruit Exchangestarting. I was the second Secretary there when the first one went into operation. The success of the Potato Exchange in Virginia is the outgrowth, but what he says is very true in interfering with their success, because you have no more power over you products than that chair has, and it is for that reason they have made a greater success of the Potato Exchange of Virginia than any exchange in America.

Mr. Jamison, of Committee on Nomenclature and Exhibits, submitted the following report.

Mr. President and members of The State Horticultural Association of Pennsylvania. Your committee begs leave to report as follows after as careful an inspection as could be made during the intervals between sessions, there being some 250 plates on exhibition.

Best selection of Pennsylvania apples. The Fruit Growers Association of Adams county, about 100 plates.

Diploma for best display of Pears, thirteen plates, Gabriel Heister, Harrisburg.

We also award diploma to Hon. W. T. Creasy, Catawissa, for fine display of apples, ten varieties.

A diploma is also awarded to L. M. Simon, Linglestown, Pa., for fine display of ten varieties of apples.

We further agree to award to J. Hibberd Bartram, West Chester, a diploma for one plate of exceedingly fine Seckel pears.

We would state further that the seeding pear grown and exhibited by John Kready, Mount Joy, Pa., is of fine quality and worthy of further cultivation. Also a jar of canned pears of same variety, represented by Mr. Kready to be a fine winter pear.

We wish to make favorable mention of the exhibit of one of the finest displays of apples. Among them are, York Imperial, Nickajack, Nero and Staymen Winesap, grown by R. M. Richardson, Wyoming, Delaware. Winesap apples and Bartlett pears by John Repp, of Glassboro, N. J., one plate of Keiffer pears by J. H. Harrison, Berlin, Md., all exhibited by Geo. H. McKay, Philadelphia.

Also several plates exhibited by Wm. Stewart.

Mr. A. O. Braugher, Kingston, Pa., fifteen plates.

Adam Berk, Kempton, Pa., seven plates.

Mr. Jeremiah Bean, of Winfield, Pa., two plates.

J. R. Snavely, Harrisburg, seven plates.

Dr. Funk, Boyertown, Pa., exhibits seven plates.

Dr. I. H. Mayer, Willow street, Pa., three plates namely, Strinetown Pippin, Champion and Winesap.

Also an exhibit of seven plates by E. H. Bancroft & Son, Wyoming, Del., among them being Stark, Tulpehocken, William's Red, Strawberry, Missouri Pippin, Highfield Fall Pippin, York Imperial, Stayman Winesap, Beach, Nero and Paragon.

Mr. J. W. Sauder, five plates.

Mr. Wm. H. Rumble, Ringtown, Pa., exhibits five plates fine apples worthy of merit.

Also one plate English Walnut grown by John G. Rush, West Willow, Pa.

We would further say that the entire collection is one of the finest if not the finest ever exhibited.

All of which is respectfully submitted.

J. E. JAMISON,
J. HIBBERD BARTRAM,
A. I. WEIDNER,
JOHN G. ENGLE,
Committee.

Resolutions commending the work of Prof. Surface, Economic Zoologist, and recommending his re-appointment, were offered by Mr. Woods, of Stroudsburg.

MR. YOUNGS.—Over there in our corner of the State we know something of the work that Prof. Surface has done, and we know that he has done it well, and while it is not completely done, I don't think it is well to swap horses while crossing the stream. For that reason, I think the horticultural interests would be best subserved by having him retained in the department which he now represents.

MR. JAMISON.—I have been in this association for a good many years, and we have had at the head of this department a man who has been in close touch with all that benefits the farmer or horticulturist. I think we never had a man that deserves as much as Prof. Surface. In all his travels he was always talking to his constituents of Pennsylvania, and I say he has done more good work in that line than an other man we have ever had, and therefore I recommend that we send up from this association a unanimous vote.

The resolution was unanimously adopted by a rising vote.

THE PRESIDENT.—If there is no other business, a motion to adjourn will be in order.

MR. BARTON.—When they were speaking of cold storage it reminded me of an experience I had a few years ago. I had some thirty or forty bushels of pears in a storage plant of my own. I had them in boxes, and put them in very close, and put one box on top of the other for fear that mice would get in, and I watched them and kept examining them. I had the temperature down to about 37 degrees, and one market day I thought the pears were in marketable condition, and taking down the first box, found they were in a very nice condition, and every other box, I threw out to the hogs. The difficulty was that they were put in, in too warm a condition; they were not cooled off, and the boxes fit very closely and tight, and I lost the whole crop of them.

MR. WOOD.—I suppose the winding up of this meeting will be a kind of experience meeting. I have not been a member very long,

but I have come quite a distance to attend this meeting, and coming here, and hearing such men as Brother Hale, Brother Brown and Brother Surface made me feel something like the colored woman that Brother Hale told us about, and I hope my shouting will not result in being shuffled out of this room as they did the colored woman. I feel that I have got more horticultural information than I had before.

MR. BROWN.—I want to express my gratitude in being here. I have noticed the growth of horticultural interests in Pennsylvania, not only in numbers, but in the character and strength of the men that compose it, and it is something very pleasing. You are banded together now in this fraternity, and are going to go forward and do those things that are necessary to be done from year to year that is going to advance this industry. I am very glad to be here tonight to meet all the old faces and many new ones. I hope we will all have the pleasure to meet in Lancaster one year hence.

MR. YOUNGS.—Allow me the pleasure of extending an invitation to you members of this society, individually, if they are ever over in the section of the State of Pennsylvania that I inhabit, to come and see us. We can show you some things over there that we are inclined to be proud of. Brother Englé is an annual visitor over there, and I think he will agree with me. My address is North East, and if you cannot run across me down town—I am often there—you can reach me by post, or by trolley, and I will be glad to meet you at the trolley line. We can show you some very fine grapes, peaches and plums, and while our work is not so satisfactory to everyone, yet it has been to us, because it brings us dollars. I think we all have horticulture in our hearts, but we are all looking after that Almighty dollar.

MR. JAMISON.—I am not a Methodist, but since the thing is going on, I am getting warmed up, and I wish to say that I attended the first horticultural meeting, which I was persuaded to do through the Secretary's father. I got my early horticultural education from him. I began to think about 1872, or along there, that we could grow peaches in Juniata county. I had a friend close to me, and we would often talk about it, and I am not so sure but that we talked about it on the Sabbath day. I planted a few trees, and we bought a few trees from Mr. Engle, and he said, "Come down to our meeting;" and when you come, I don't want you to go away from this meeting until you tell us how you are getting along up there. I told them how we took the hills of Juniata county and cleared them of briars and brush and made the peach bloom as the Lily of the Valley, and when we were through, there were one hundred thousand trees growing in the Juniata Valley, and the bankers in our county seat will tell you that for years one hundred thousand dollars were thrown annually into the banks. What brought it about? It was the work of this horticultural society. When I look around me here now, I see very few familiar faces who were members then. Here is brother Bartram; there is Brother Engle, and Brother Heister; there are not many others, and it will be a very short time until the rest will have to answer the last roll call.

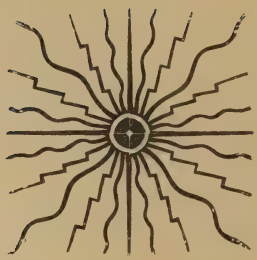
MR. HEISS.—Mr. President, this is the first time I have had the pleasure to meet with you and look into your faces, but I can go back into the hills of Clearfield county and Centre county, and talk with the farmers with a new inspiration and as a helper in the work, and I trust I may long remember the new faces I have met here, and whether I ever meet you again, I want you to know that this meeting has done me as much good as any meeting I have ever attended.

MR. McKAY.—I am a Methodist too, and I believe in giving good advice. I don't believe in sitting here with no smile on your face, and take it all in, and not give anything back. I think the fruit growers are going to pull through allright. It reminds me of the story of a young man who had a mother-in-law who was very sick, and he went out and met the doctor, and he asked how his mother-in-law was, and he replied that she was pretty bad; I don't think we can pull her through, and he said, "Bring an axe, and I will help her through." I feel I am going to be a fruit grower, and that I have obtained a great deal of information by coming here, and hearing the old gentlemen talk on the subject of fruit growing, and it is also pleasant to look at the fruit that is here on exhibition, and I know it will be of great benefit to me in applying it to my business. There is nothing done in this world without discussion, and as Mr. Hale knows up in New Hampshire they will argue for days and days, and this discussion is what brings out the different points, and a great many of these fruit growers will get together, and talk about cold storage, and they will come to some understanding. As a Methodist, I say, God bless all of you.

MR. YOUNGS.—I came over here four years ago; we had some trouble over there; and said something about spraying. As a whole you might just as well have tried to talk about anything else, and I told you we cultivated a pretty hard soil at that time; at any rate, it looked so to me. I am one of those who like to come to a meeting of this character, and get something out of it, and I have not come this way for four years. You can get up a lot of enthusiasm here, and gather the farmers together, and although it is 366 miles to my place, I feel like coming again.

THE PRESIDENT.—I guess we have heard from all the converts and we are now ready for a motion to adjourn.

THE PRESIDENT.—As no one seems to be able to summon up nerve sufficient to move to adjourn, I declare this meeting adjourned until this day next year, when we shall meet in Lancaster, Pa.



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FOR 1908

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STATE HORTICULTURAL ASSOCIATION OF PENNSYLVANIA

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PRESIDENT.

Gabriel Hiester, ... Harrisburg.

VICE PRESIDENTS.

Hon. W. T. Creasy, ... Catawissa.
F. H. Fassett, ... Meshoppen.
R. M. Elden, ... Aspers.

RECORDING SECRETARY.

Enos B. Engle, ... Waynesboro.

CORRESPONDING SECRETARY.

Wm. P. Brinton, ... Christiana.

TREASURER.

Edwin W. Thomas, ... King of Prussia.

MEMBERSHIP

LIFE MEMBERS.

Bartram, J. Hibberd, Milltown, Chester Co.
Boyer, John F., Mt. Pleasant Mills, Snyder Co.
Brinton, Wm. P., Christiana, Lancaster Co.
Chase, Howard A., Philadelphia.
Chase, Charles T., Philadelphia.
Calder Dr. James Harrisburg, Dauphin Co. (deceased).
Cornelius Robert, Philadelphia (deceased).
Cummings, H. C., Sunbury.
Creasy, Hon. W. T., Catawissa, Columbia Co.
Engle, Henry M., Marietta, Lancaster Co. (deceased).
Engle, John G., Marietta, Lancaster Co
Engle, Enos B., Waynesboro, Franklin Co.
Ermentrout, Hon. Jas. N., Reading, Berks Co.
Fox, Cyrus T., Reading, Berks Co.
Garrettson, Joel V., Floradale, Adams Co.
Good, C. W., Waynesboro, Franklin Co.
Hacker, William, Philadelphia (deceased).
Hartman, D. L., New Cumberland.
Hayes, Charles P., Philadelphia.
Heyser, Jacob, Chambersburg, Franklin Co. (deceased).
Hiester, Gabriel, Harrisburg.
Hildrup, W. T., Raleigh, N. C.
Hiller, Casper, Conestoga, Lancaster Co. (deceased)
Hiller, Peter C., Conestoga, Lancaster Co. (deceased).
Hoopes, Josiah, West Chester, Chester Co. (deceased).
Huff, L. B., Greensburg.
Huff, Burrell R., Greensburg.
Landis, Israel, Lancaster, Lancaster Co.
McCormick, Harry, Harrisburg, Dauphin Co. (deceased).
McCormick, James, Harrisburg, Dauphin Co.
McLanahan, J. King, Hollidaysburg.

Martin, J. O., Mercersburg, Franklin Co.
Meehan, S. Mendelson, Germantown, Philadelphia Co.
Mitchell, Ehrman B., Harrisburg.
Pannebaker, Wm. M., Virgilina, Va.
Reist, Peter S., Lititz, Lancaster Co. (deceased).
Reist, John G., Mt. Joy, Lancaster Co.
Scribner, Prof. F. Lamson, Knoxville, Tenn.
Shaffner, Jacob, Harrisburg, Dauphin Co.
Swift, Rev. E. P., Mt. Oliver, Allegheny Co. (deceased).
Thomas, George B., West Chester, Chester Co.
Thomas, Edwin W., King of Prussia, Montgomery Co.
Van Deman, H. E., 3630 13th St., N. W., Washington, D. C.
Wertz, D. Maurice, Quincy, Franklin Co.
Woods, Edward A., Frick Building, Pittsburg.

HONORARY MEMBERS.

Barry, P., Rochester, N. Y., (deceased).
Downing, Charles, Newburgh, N. Y. (deceased).
Ellwanger, George, Rochester, N. Y. (deceased).
Edge, Thomas J., Harrisburg, Pa.
Garber, J. B., Columbia, Pa. (deceased).
Heiges, Prof. S. B., Saxe, Va.
Meehan, Thomas, Germantown, Pa. (deceased).
Michener, Dr. E., Toughkenamon, Pa. (deceased).
Parsons, Prof. S. B., Flushing, N. Y.
Parry, William, Parry, N. J. (deceased).
Rathvon, Prof. S. S., Lancaster, Pa. (deceased).
Rowe, Hon. D. Watson, Chambersburg, Pa.
Rutter, John, West Chester, Pa. (deceased).
Saunders, Wm., Washington, D. C. (deceased).
Stitzel, George D., Reading, Pa. (deceased).
Thomas, John J., Union Springs, N. Y. deceased).
Warder, Dr. John A., North Bend, O. (deceased).
Wilder, Marshall P., Boston, Mass. (deceased).
Wickershaw, Dr. J. P., Lancaster, Pa. (deceased).
Willetts, Rev. Dr., Philadelphia, Pa. (deceased).

ANNUAL MEMBERS.

Adams, W. S., Aspers.
Allison, J. W., Mercer.
Armsby, Dr. H. P., State College.
Baird, A. T., Island.
Banks, William, Mifflintown.
Barlow, Thos. W., Fort Washington.
Barnard, C. P., Northbrook.
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Boltz, P. R., R. D. No. 10, Lebanon.
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Boyer, F. D., New Cumberland.
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Breisch, D. D., Ringtown.
Breisch, Robt., Ringtown.
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Bridges, George, Carlisle.
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Brinton, W. H., Parkesburg.
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Cooper, Madison, Watertown, N. Y.
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Demming, H. C., Harrisburg.
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Erb, Amos H., Lititz.
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Good, Martin R., Narvon.
Graybill, Hon. D. W., East Petersburg.
Greenfield, A. B., Conneautville.
Griest, C. H., Guernsey.
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Gross, Joshua W., Harrisburg.
Grove, W. E., York Springs.

Gump, Dr. S. H., Bedford.
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Haines, Mary M., Cheltenham.
Hait, John D., Bryn Mawr.
Harnish, H. H., Hubers.
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Harper, Wm. Warner, Chestnut Hill.
Harris, Philip, Light Street.
Harris, Joseph, Shamokin.
Hartman, L. E., Etters.
Hartley, A. D., R. D. No. 3, Pottstown.
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Herr, Daniel D., Lancaster.
Herr, David S., R. D. No. 7, Lancaster.
Herr, John D., Millersville.
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Hess, Charles C., Phillipsburg.
Hess, Enos H., Lancaster.
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Huston, Charles L., Coatesville.
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Hibshman, George, Ephrata.
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Hull, D. W., Waymart.
Hunt, Dr. Thomas F., State Colllege.
Ide, Silas C., R. D. No. 1, Alderson.
Jones, S. Morris, West Grove.
Kauffman, D. C., York.
Kauffman, E. F., R. D. No. 3, York.
Keath, Dr. J. W. Shaefferstown.
Keller, Walter J., Pottsville.
Kerr, W. M., 608 Bourse, Philadelphia.
Kloss, D. S., Tyrone.
Knuppenberg, D. A., Lake Carey.
Koons, Dr. P. R., Mechanicsburg.
Kready, John, Mount Joy.
Kready, W. S., Mount Joy.
Kraybill, S. S., Mount Joy.
Krewson & Son, Jas., Cheltenham.
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Leyder, J. S., 319 Peffer St., Harrisburg.
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Loop, A. I., North East.
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McAllen, R. W., Fannettsburg.
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McSparran, W. F., Furniss.
Maffet, Miss M. A., 264 S. Franklin St., Wilkes-Barre.
Mansfield, I. F., Beaver.
Marshall, Mrs. J. L., 239 4th Ave., Pittsburg.
Martin, Hon. A. L., Harrisburg.
Mayer, H. M., Rohrerstown.
Mayer, Dr. I. H., Willow Street.
Meehan, Thos. B., Germantown.
Miller Fruit Packing Co., Rochester, N. Y.
Miller, John D., Newton Hamilton.
Miller, N. G., Harrisburg.
Moon, Samuel C., Morrisville.
Moon, Wm. H., Morrisville.
Morton, Mrs. Elizabeth D., Ingram.
Mosser, H., Myerstown.
Moudy, J. E., Littlestown.
Musser, E., Lincoln.
Newcomer, W. S., Glenrock.
Nissley, P. R., Mount Joy.
Nissley, S. K., 14 E. Chestnut St., Lancaster.
Patterson, Jas. G., Stewartstown.
Peters, Earl, Carlisle.
Persing, E. E., Sunbury.
Pierce, Miss B. G., 3300 Arch St., Philadelphia.
Pratt Co., B. G., 11 Broadway, N. Y.
Prickett, Josiah W., Biglerville.
Purvis, Timothy, Hunsecker.
Pyle, J. W., Kennett Square.
Rakestraw, Thomas, Kennett Square.
Reel, Geo. L., Columbia.
Reichert, J. H., Host.
Richardson, F. W., Paoli.
Rick, John, Reading.
Rinehart, Geo. W., R. D. No. 4, York.
Rife, Jacob L., Camp Hill.
Rittenhouse, Dr. J. S., Lorane.
Roberts, Horace, Moorestown, N. J.
Root, A. W., Manheim.
Root, J. W., Manheim.
Rumble, W. H., Ringtown.
Ruof, Fred, Hummelstown.
Rupp, D. C., Shiremanstown.
Rush, John G., West Willow.
Schaeffer, Dr. N. C., Lancaster.
Schock, Oliver D., Hamburg.
Scholl, Calvin P., R. D. No. 1, Halifax.
Shalcross, Frank R., Frankford, Philadelphia.
Sharpless, John D., London Grove.
Shepard, J. W., Scranton.
Shorb, Albert, Hanover.
Sierer, Dr. A. L., Harrisburg.
Snavely, H. C., Lebanon.
Snavely, H. H., Willow Street.
Snavely, J. R., Harrisburg.
Snavely, M. H., Cleona.
Stein, Geo. E., East Prospect.
Stephens, A. W., Lewisburg.
Stewart, William, Landisburg.
Stoney, R. J., Jr., 424 5th Ave., Pittsburg.
Stout, W. H., Pinegrove.
Stover, F. S., Bowmansville.
Strode, A. Darlington, West Chester.
Stroud, J. W., Black Walnut.
Surface, Prof. H. A., Harrisburg.
Swartwood, W. H., R. D. No. 1, Ransom.
Thomas Ernest K., University of Pennsylvania, Philadelphia.
Thompson, Dr. S. Y., Danville.
Traver, F. E., Wyebrook.
Tyson, Edwin C., Floradale.
Tyson, Chester J., Floradale.
Tyson, W. C., Guernsey.
Wadhams, Miss L. F., Wilkes-Barre.
Wagner, Geo. A., R. F. D., Landisburg.
Wallings, Don, Clifton Heights.
Walton, Robert J., Hummelstown.
Watts, Prof. R. L., State College.
Weast, Geo. B., Harrisburg.
Weidner, A. I., Arendtsville.
Weise, H. B., Parkesburg.
Wheaton, E. H., Knoxville.
Wilbur, Harry, Bethlehem.
Wilder, Henry J., Dept. of Agriculture, Washington, D. C.
Williamson, E. C., Morrisville.
Withrow, J. C., Vanport.
Winner, W. G., Calvert.
Wood, J. C., Stroudsburg.
Yentzer, J. R., Conestoga.
Youngs, L. G., North East.
Zeigler, Amos, Rowenna.
Zercher, Andrew, Conestoga.
Zerr, E. M., Geiger's Mills.
Zinn, W. H., Dauphin.

REPORT

OF THE

FORTY-NINTH ANNUAL MEETING

OF THE

State Horticultural Association

OF

PENNSYLVANIA

Held at Lancaster, Pa., January 14-15, 1908

The Forty-ninth Annual Meeting of the State Horticultural Association convened in Court Room No. 2, at Lancaster, at 9 o'clock Wednesday morning, January 14, 1908, with the President, Mr. Hiester, in the Chair.

THE PRESIDENT.—I am glad to see so many fruit growers present at our first session. I notice many faces in the audience not familiar to me. I hope those who come from a distance will make it a point to come up between sessions and shake hands with me, and introduce themselves. I would like to make the personal acquaintance of everybody here. The first thing on the program is the reading of the minutes of the last meeting. Will the Secretary please read them?

The Secretary thereupon read the minutes of the last meeting, which were approved as read.

THE PRESIDENT.—The next on the program is roll call and collection of dues. It has been customary at this time to take a recess to allow members to do this, and in accordance with this custom, we will now take a recess of a few minutes. Our Treasurer is absent, being detained by the nurserymen's meeting, now in session in this city, but our Secretary, Mr. Engle, will take his place.

A MEMBER.—Mr. Chairman, will you please announce before we take this recess that any good man who has a dollar is eligible to membership? There are many good men here in Lancaster county who have a dollar.

THE PRESIDENT.—I will repeat that announcement; any *good* man who has a dollar is welcome to become a member, and any *good* man who is interested in fruit, whether in the raising, selling or eating of it, is welcome to come up and pay his dollar.

A recess of ten minutes was then taken, during which time the members present paid their dues and were enrolled. The following were added to the list of members for the year:

Bergey, James, Mifflintown.
Berkey, Edwin A., R. D. No. 3, Easton.
Boltz, Peter R., R. D. No. 10, Lebanon.
Brinton, Samuel L., West Chester.
Brinton, W. H., Parkesburg.
Carter, John I., Chatham.
Cooper, Madison, Watertown, N. Y.
Cumbler, H. B., Logania.
Davis, Dr. S. T., Lancaster.
Durell, Charles A., Reading.
Fulton, Hugh R., Lancaster.
Haines, A. S., West Chester.
Heine, J. E., Orwigsburg.
Hertzog, P. H., Box 756, Harrisburg.
Hibshman, George, Ephrata.
Hostetler, Abram, R. D. No. 3, Johnstown.
Hunt, Dr. Thomas F., State College.
Ide, Silas C., R. D. No. 1, Alderson.
Kauffan, E. F., R. D. No. 3, York.
Knuppenberg, D. A., Lake Carey.
MacNeil, W. H., Parkesburg.
Musser, E., Lincoln.
Nissley, S. K., 14 E. Chestnut St., Lancaster.
Reel, Geo. L., Columbia.
Rick, John, Reading.
Roberts, Horace, Moorestown, N. J.
Stewart, William, Landisburg.
Strode, A. Darlington, West Chester.
Walton, Robert J., Hummelstown.
Wheaton, E. H., Knoxville.
Wilder, Henry J., Department of Agriculture, Washington, D. C.
Winner, W. G., Calvert.
Yentzer, J. R., Conestoga.
Zercher, Andrew, Conestoga.
Zerr, E. M., Geirger's Mills.
Zinn, W. H., Dauphin.

DR. MAYER.—We have with us, with credentials from the Farmers' League of Lancaster County, A. J. Stively and Charles Coates; from the Fulton Grange we have Walter Earnhart and Mrs. Lizzie Earnhart. I move that we receive these people and grant them the privilege of the floor.

THE PRESIDENT.—We have also with us Mr. Horace Roberts, of the New Jersey State Horticural Association. Suppose we amend that motion so as to include him, and then act on it.

DR. MAYER.—I am pleased to accept the amendment, and move that we give these people the privilege of the floor.

This motion was adopted.

THE PRESIDENT.—We are pleased to welcome these friends. We trust you will feel yourselves perfectly free to enter into the discussions, the same as if you were regular members of the Society.

Next in order is the election of officers. How shall this eelction be conducted? It has always been customary to elect through a nominating committee. This matter has been discussed at several of our meetings, and it was decided that the best way to get at it was for the chair to appoint this committee. I object to that method. If it is the desire of the Association to elect by means of a nominating committee, they can select the members, who can make the nominations and place them before the house later on, but I object to having the Chair appoint that committee.

MR. McSPARRAN.—I would rather have the chair appoint that committee. We always get good officers in that way.

THE PRESIDENT.—I object to that, but will be ready to receive nominations for the committee, which usually consists of five members.

Mr. McSparran, Dr. Mayer, Mr. J. D. Herr, Mr. J. W. Prickett and Mr. Jacob L. Rife having been nominated, it was moved and seconded that the nominations close. The gentlemen named therefore constitute the nominating committee.

THE PRESIDENT.—Next in order is the Reports of Officers. We will have the Treasurer's report a little later. Are there any other officers who have reports to make? If not, we are ready to listen to the reports of special and standing committees, if there are any. If not, we will proceed with the report of the General Fruit Committee, by the chairman, Mr. Chester J. Tyson.

Mr. Tyson then read the following:

REPORT OF GENERAL FRUIT COMMITTEE.

The Chairman wishes to thank each member, who, by willing and hearty co-operation, has made this report possible.

For the information of those who are not familiar with the work of the General Fruit Committee, a few words of explanation may not be amiss. Toward the end of the year 1907 a printed form, containing fifty-five questions, divided under fourteen heads, was mailed to each of 200 names, representing every county in the State. With each went also a circular letter of explanation and a stamped return envelope. Out of the 200, nearly 100 persons responded, thereby becoming members of the General Fruit Committee for 1907.

Many of the reports were prepared with great care and all of them were full of information. From these answers the general report has been compiled. The statements following are not, therefore, based on the personal view or opinion of the Chairman but are, so far as possible, his interpretation on the views of many correspondents.

For convenience, we have divided the State into four sections, Northern Border, Southern Border, Eastern and Wester, placing the central counties in the group with which their reported conditions seemed to be most closely allied.

APPLES.

Pennsylvania is one of the great apple States; the last census placed her third in total value of all fruits and second only to New York in bushels of apples produced. While no figures are yet available, there is little doubt that the season just past has placed Pennsylvania at the head, not only in bushels of apples but in money received for the crop.

In every county where soil conditions are at all suitable, apples are proving a profitable crop. Out of about ninety replies, only seven report the crop unprofitable. A few report "profitable this year" and in most cases follow by saying "Conditions are better because of more spraying and better care." All of which seems to warrant the belief that Pennsylvania, in its soil, climate and people is well suited for apple growing and that at least some of these conditions are improving each year.

The season of 1907 has been a great one for apple growers. Of all reports, only nineteen tell of a poor crop. Twenty-three report a fair crop, thirty a large crop, while seven report for their districts in such terms as "enormous," "largest in years" and "extraordinary." Ninety per cent. of the causes for poor yield or only fair crops were late, killing frosts and unfavorable weather at blooming time. This condition existed pretty generally in the Western Section, and to some extent in the western end of the Northern Section, and in a few of the central counties. With but few exceptions the balance of the State, embracing the principal apple counties, had a fine crop. The figures for Adams county alone for 1907, are, for all grades, equal to 319,617 bushels of apples and returned to the growers over $174,-000.00. In general, the quality of the fruit was good. The yield and quality being closely parallel, such expressions as "excellent," "unusually good," etc., being very frequent. Unfavorable conditions reported were frost and unseasonable weather and neglect of orchards. Causes of success are favorable season, increased spraying and good care of orchards.

The vote on five most profitable winter apples seems to show as follows: Northern Section, in the order named: Baldwin, Spy, Greening, King, Ben Davis; Southern Section, York Imperial, Baldwin, Grimes' Golden, Ben Davis and Smith Cider; Eastern Section, Smith Cider, Baldwin, York Imperial, Ben Davis, Fallawater; Western Section, Ben Davis, Rome Beauty, Baldwin, Spy, Russett. Other varieties frequently mentioned in the reports are Smokehouse, Staymans' Winesap and Rambo. Several reports indicate that with the increased spraying the Baldwin is becoming more profitable in the southern counties, and recent investigations of conditions in the Philadelphia apple market show Pennsylvania Baldwins selling at a premium of two to three dollars per barrel over New York Baldwins. We also wish to recommend growers to look into the possibilities of the Rome Beauty, which, by reason of its size and handsome appearance, coupled with fair quality, seems to be in high favor now. One of our correspondents recommends the Senator apple very highly as a filler, saying that it is as handsome as Wealthy, bears better and has better flavor.

Only twenty-two correspondents report any commercial planting of summer and fall varieties. Many express an opinion that such

planting would be profitable and the Chairman recommends that growers give more attention to this field of apple culture.

In answer to the question: "Do growers pack their own apples and does it work satisfactorily?" only about one-third of the answers were affirmative, but in nearly every case the report showed satisfactory results where this plan had been tried and there is little doubt that growers can sell to better advantage when equipped for doing their own packing.

"Would you favor a law to enforce uniform grading and packing?" brought out forty-nine affirmative and eighteen negative answers, many being strongly in favor of such legislation and a few expressing doubt as to the possibility of successful regulation.

PEARS.

The pear crop the past season has been a light one in nearly all parts of the State. In most cases the quality was good, a very few reports showing poor quality.

The outlook for future pear crops in Pennsylvania, however, does not seem very bright. Only eight counties report any commercial planting of pears and many of the old trees are going out rapidly.

Blight is by far the most serious enemy to successful pear growing and is reported to be doing much damage. San José Scale, when not controlled, is causing much loss to pear growers.

Favorite varieties are Bartlett, Keiffer and Seckel, in the order named, with Clapp's Favorite, Sheldon and Lawrence mentioned three or more times.

PEACHES.

The peach crop in Pennsylvania was almost a failure, only four reported a good crop, nine fair and fifty-four reported very poor. With a very few exceptions, correspondents reported conditions exceedingly unfavorable for this fruit. Late spring frosts and rain at time of blooming were reported for nearly all sections. The vote is almost evenly divided between yellows, borers, and scale as the most destructive enemies of the peach grower. Regarding Brown Rot, eight report that it is being controlled, thirty report that it is not controlled, while seven say they have no trouble with Brown Rot. There is decided lack of unity in answering the question "Is peach culture profitable in your county?" thirty-six answering "Yes" and thirty giving a negative answer. It is hard to divide the State with reference to these two conditions, but in general the southern counties, some of the central ones, and a few of the eastern ones report fair profits while north and west, with the possible exception of Erie and Crawford counties, peaches do not seem to do well.

PLUMS.

The crop was light, only nine persons giving a favorable reply and in most cases frost and rainy weather were the causes assigned for this failure.

Curculio, Black Knot, Scale and Brown Rot are the most serious enemies to plum culture in the State. A few reports show loss from yellows.

German Prune is given first place as a profitable variety, followed

in order by Burbank, Damson, Abundance, Lombard, Green Gage, Wickson, Red June and a long list mentioned only one or twice.

Eight persons recommend the one-half bushel basket for marketing plums, five prefer quart boxes and four use a five-pound basket.

CHERRIES.

Most correspondents report the successful growing of cherries and thirty out of forty-five answers indicate that the crop is profitable.

Distance from market, rot and birds are the chief adverse conditions reported. Sour cherries are most favored as desirable shippers, Montmorency and Early Richmond receiving nearly all the votes.

GRAPES.

Grapes grow successfully in most sections of the State and are so easily grown and with a little care, are so generally satisfactory that no country home should be without several vines. Rot and rose bugs, both easily controlled by spraying, are the chief difficulties reported. Commercial grape growing has been very profitable in some of the northern counties, particularly Erie and in a few other sections favorably situated as to soil and market. It is by no means general, however. Concord takes the lead as a variety recommended for home use, with fifty-one votes, followed closely by Niagara, Worden and Moore's Early. Brighton, another excellent variety, is named eight times, Delaware and Salem five times, and Campbell's Early four times, with fifteen varieties mentioned once or twice.

SMALL FRUITS.

Comparatively few correspondents had experience sufficient to warrant their reporting on most profitable varieties of strawberries. A large part of the State, north and west, reports "No strawberries grown." The vote on varieties follows: Bubach, 12; Haverland, 11; Glen Mary, 10; Sharpless, Senator Dunlap, and Sample, 7; Brandywine and Wm. Belt, 5; Gandy and Cumberland, 4 each.

In raspberries, Cuthbert takes the lead, followed by Gregg, Cumberland and Kansas. Two correspondents recommend Black Diamond raspberry very highly.

"Name some of the hardiest and best blackberries." The answers to this question brought out the interesting fact that in more than half the State wild blackberries grow so plentifully that but few tame ones are cultivated.

Snyder is named 17 times, Eldorado 9 times, Erie 7 times, Taylor and Kitatinny 5 times.

Sixteen correspondents report profitable growing of currants and 10 report gooseberries favorably.

VEGETABLES.

Sixty per cent. of the reports show that the past season has been favorable for the growing of vegetables, a few reporting unfavorable weather conditions.

Regarding the most destructive enemies, correspondents are practically united on Blight of potatoes, tomatoes, etc., as the most serious. Other troubles mentioned several times are Cabbage Worm, Cabbage Root Maggot, Cut Worm, Wire Worm, Potato Beetle, Anthracnose and Mildew.

Cabbage and potatoes are given equal credit as being the best paying crops. Tomatoes, sweet corn and beets are reported frequently and celery, onions, peace and asparagus are mentioned three or more times.

Only six correspondents report market gardening unprofitable in their counties.

SPRAYING.

Taking the State as a whole, the reports show that spraying for insects and fungi is increasing, although many correspondents report no increase for their sections. Compared with past years, we feel that conditions in this respect are gratifying. Not so, the answers to the question, "Isc spraying thoroughly done?" forty-eight say "No" and only thirteen "Yes." This seems to us a most unfortunate condition. Nearly every report, referring to one crop or another, expresses a need for more thorough spraying and the answers to the question "What are the results of spraying?" are almost with one voice, "Good when thoroughly done." We feel that this point cannot be too strongly impressed on the minds of all persons who attempt to spray at all. It seems very clear to us that it matters much less which of the many excellent formulæ and preparations recommended to-day you decide to use, than that you practice the greatest care and thoroughness in the application of your choice.

SAN JOSE SCALE.

This insect is now found in nearly every fruit-growin section of the State. Abnormal weather conditions during the principal breeding season of the past year have tended to check its spread to some extent. This fact must not, however, be taken as an excuse for failing to spray during the present winter or coming spring, for plenty of live scales are present to guarantee a very healthy increase if unmolested.

Twenty-seven correspondents report that San José Scale is being held in check. Twenty-three say it is not, in most cases, because of neglect and failure to spray and where sprayed, but poorly done.

The question "What is the most effective spraying material you have used?" brought many interesting answers, some of them of considerable length. The space of this paper will not allow us to give more than a synopsis of the results, as follows: Lime and sulphur wash (sometimes with salt), 31 reports; soluble oils (two commercial preparations being mentioned), 23 reports; kerosene emulsion, 3; crude petroleum, 2; whale oil soap and Tak-a-nap Soap, 1. Nearly all correspondents who have had experience with commercial spray preparations report success and satisfaction with their use.

FERTILIZERS.

"Are commercial fertilizers used larged by your fruit growers?" "Yes," from twenty-six correspondents, and "No" from forty-three. The affirmative answers coming mostly from the fruit-growing counties and the negative answers, with a few exceptions, from sections where fruit growing is incidental.

Nearly all correspondents agree that stable manure can be used profitably on orchard soil. A considerable number, however, qualify this statement by saying "but not for peaches," which we believe is a

pretty general experience. A few object to stable manure as not being sufficiently uniform or properly balanced.

Twenty-three reports favor the use of lime in the orchard, while seven discourage its use. It is favored because it sweetens the soil (renders it alkaline), loosens the soil when "tight" or heavy and serves as a solvent for fertilizer elements already present in the soil.

TILLAGE.

The queries on this subject brought so many and such widely varying answers that the chairman of this committee finds it almost impossible to fix on one or even on two or three methods that are at all generally practiced.

Most persons agree that peaches should have clean culture. Aside from this, the practice of orchard cultivation seems to be limited almost entirely to commercial plantations, except such cultivation as trees may receive from the working of hoed crops planted in the orchard. Regular crop rotation with two or three successive years of grain and sod seems to be a common practice in most sections.

"Hog culture—no rings" is recommended and for a bearing orchard of limited area, doubtless works very well. The Chairman finds that his own experience follows closely that of several correspondents and takes the liberty of making the following recommendations for tillage of apple orchards: From time of planting up to time when trees occupy most of the ground, cultivate thoroughly each season, intercropping if desired with some cultivated crop or if a grain or grass crop is used, leaving a generous strip on each side of tree to be cultivated. When potatoes can be grown, they afford an excellent crop for orchard planting. When trees have come to bearing age so that summer spraying is needed, it will probably seem best to discontinue the inter-cropping. Begin cultivation early in the spring, plowing shallow or cutting up with disc and following with spring-tooth harrow. Continue until mid-summer, then sow a cover crop or allow a volunteer growth of grass and weeds to grow, mowing once or twice during summer. When nitrogen seems to be needed, common red or crimson clover are excellent cover crops. When wood growth seems to indicate sufficient nitrogen, rye answers the purpose and is easily grown.

Twelve correspondents report good results from mulching apple trees, especially on hillsides and recommend using grass, weeds or any other material available for the mulch.

ORCHARD ENEMIES.

As means for destroying the English Sparrow, shooting and feeding with poisoned grain are suggested. One correspondent recommends offering a price for them.

A good deal of damage by mice and rabbits is reported. This can be avoided to a considerable extent by keeping grass and rubbish away from trees and hilling up the ground slightly before winter sets in. Several correspondents recommend protecting with coverings of veneer, wire netting or building paper. Twigs or clippings left on the ground under trees will often divert mice from attacking the tree. Most persons advise the use of knife and wire for extracting borers. A few suggest as partial preventives lime around tree, whale-oil soap and carbolic acid, boiling water, and wood ashes.

The Chairman has had very good results by painting the trunks of apple trees with whitelead and lineseed oil against both mice and borders.

THE PRESIDENT.—This excellent report is before the house for discussion. We will be ready now for any remarks which you may wish to make on the subject.

PROF. SURFACE.—I would like to have the opportunity to add my hearty endorsement to that part of the report which touches upon the lines of my work, and upon the subjects which I have made a special study. I wish to emphasize the fact that thoroughness in spraying is even more important than what is used. Most of the failures to overcome the pests in our orchards are due to this lack of thoroughness in spraying, but I have in my office a pile of communications from all parts of the State which go to show that fruit culture in the State of Pennsylvania is gradually getting on its feet, and getting down to the kind of work that should be done in an orchard. I think we all feel that there is a great deal in this report that is worthy of our endorsement, and I would move it be accepted and filed for publication.

The motion was adopted.

MR. CARTER.—I would like to say, Mr. Chairman, that I am rather surprised to find from reports from different counties in the State that the Baldwin apple has been considered worthy of selection. In our section of Chester county, as most of us people know, it is too early for a winter apple. Another thing that struck me as rather singular is, that many of the sorts recommended here were old friends, very few new names standing at the head in this report.

THE PRESIDENT.—The Chair would suggest that many of our best men are our old men, and would suggest also that when our friends used to attend these meetings some twenty or thirty years ago, they thought Chester county was the State of Pennsylvania. We are now growing apples all over the State, and we have reports come in from counties that you did not hear of thirty years ago.

MR. FENSTERMAKER.—I differ with the gentleman in regard to painting his trees with white lead to keep away the borers and mice. It will keep away both, but you will have a sorry looking tree afterwards; the bark will have a rough, unhealthy appearance, and my experience has been that it injures the tree.

DR. MAYER.—In regard to the Baldwin, and other later varieties, these were the ones principally planted years ago, and if you ask a man the varieties of fruit he raises, he will probably mention the Baldwin first, because it comes first in the newspaper reports. It is largely a matter of habit. If we were to go over our neighborhoods, we would find that we have other varieties that are more profitable than the Baldwin. We have them in our county, and I am sure that others have them too. Take, for example, the Greening and the Northern Spy. Then, there are other and newer varieties, but they have not the reputation that the Baldwin has, and because of this fact, reports are apt to be a little misleading.

MR. TYSON.— In explanation of that point, I should like to say that a very interesting feature came out in a good many of the reports, especially the reports from the southeastern portions of the State, to the effect that the Baldwin is more profitable than it used to be. We are better able to hold them on the trees by spraying; similar remarks were made in six or eight of the reports, and it led me to make special mention of it in the report.

THE PRESIDENT.—I am very glad that Mr. Tyson brought out that point. I have grown Baldwins for thirty-five years, and before I began spraying, more than three-fourths of my Baldwins dropped to the ground and rotted before picking time, but I have found that by spraying and keeping the leaves on the trees, we can keep the fruit there also. Where the altitude is low it cannot be done so well, but even half a degree higher up, where we keep the leaves on the tree, we keep the fruit. I am glad that Mr. Tyson emphasized this at this time. This is something I have been preaching to a large extent.

MR. JAMISON.—In Juniata county the York Imperial is the money-maker, and many of our people say that they prefer to raise the Ben Davis to the Baldwin. They get as much money for the Ben Davis as they do for the Baldwin, and it is not so hard to grow. I have seen a thousand bushels of apples go to market as Baldwins, three-fourths of which were Ben Davis. They claim the buyer is not able to tell the difference. Thirty-five or forty years' experience has taught me that the Baldwin apple does not do so well in the valley as it does in the mountains. There is one point that I wish to make that I did not notice in the report (and I watched it very closely), and that is this: my experience has been that you should spray the fruit too; not only the tree, but the fruit as well. That does the work.

THE PRESIDENT.—What do you spray them with?

MR. JAMISON.—Lime and sulphur; I sprayed the tree first, but did not see any sign of scale, so I thought I would try spraying the fruit, and I have never had such fine fruit as I have since I spray the fruit.

MR. SCHOLL.—In regard to spraying on the fruit, you know I live up in Schuylkill county, and one day up in the Analomink Mountains I met a man, a huckster, whose wagon was standing in the middle of the street; he showed me an apple that was as large and smooth as that apple there, and he asked me, "do you know what that apple is?" I said, "I don't know unless it is a Northern Spy, but I never saw one so large and smooth as that one is. He said it was a Northern Spy, and he showed me the tree, standing right inside his gate. It was a fine tree, and he told me that he sprayed it with Paris green to keep the worms off. He said that that particular tree had had five applications of Paris green in two years, one pound to a barrel of water. "This year I done it again," he said, and these are the apples that grow on it." I have his word for it, and his neighbors tell me that it is the truth. Those apples are just as smooth as though they were polished, and from a tree not a hundred

yards from this one, which he had not sprayed, every apple dropped off. He said these had done the same before he sprayed with Paris green. I will repeat the proportion: one pound of Paris green to a barrel of water, five applications to a tree in two years.

MR. HARTMAN.—The report recommended rye as a cover crop. Now, I used it with bad results. It may be that it is all right for fruit-grower, but I have found it very detrimental in the market garden. I cannot explain why that should be the case, but I have found that the use of rye as a cover crop has had injurious effects on the crops following.

MR. GOOD.—There is one point that I may have missed, or it may not have been brought out in the report, and that is in regard to the worst enemies of the grape, the rot and the rose bug, both of which can be fortunately overcome by spraying. I suppose the spray for the bug should be some poison, like arsenic. My experience has been that bagging the grape is not enough; hand bagging does not always do the work; it is necessary to spray them besides.

Now, the gentleman on my right said something about the buyer not knowing the difference between the Ben Davis and the Baldwin apples. A great many times the consumer does not know the difference. Now, I notice that the Ben Davis is crawling up. There are a great many of them on the market, and as a seller, it would rank first with me. It will last longer than any other apple; it is a beautiful apple; I have seen very few handsomer ones, and although on the whole, the taste is not so good as that of some other apples, you will find a great many of them that have a good taste.

MR. BRINTON.—I have been listening to the remarks on the subject of spraying, but there is one point in regard to the apple that has not been brought out, and which is in my opinion of almost equal importance in growing the apple for market, and that is in sorting the apples. In my experience of growing and selling apples in three different States, I have found a great many cull apples thrown on the market through neglect to sort them properly, and this lowers both the standard and the price. I think this is a point that should not be overlooked.

PROF. SURFACE.—I do not feel like passing by that remark on painting that was raised by our friend, Mr. Fenstermaker. In a meeting of this kind there is always a difference in point of view, and it is well to bring out these differences of opinion, and discuss them. We have reports from some orchardists that their trees have been injured by the use of white lead against borers and worms, whereas the Chairman has reported successful results. Now, there is a difference in results. I believe that one of the purposes of a convention like this is to get down to the bottom of things like this, and see what is what and who is who.

Now, it is known that the ordinary commercial white lead when used on a tree, is apt to be very injurious to the tree. Commercial whitelead, such as is used in painting houses is apt to contain turpentine or dryer, which is likely to injure the tree, but I have seen thousands of trees painted in this State with pure whitelead, without any injury to the trees. I have seen it in Mr. Tyson's orchard, and

I have tried it in my own orchard, without any bad results, but I don't think the results are apt to be good from the use of anything except absolutely pure whitelead and raw linseed oil.

Mr. Hartman brought out a point that is of interest to me. I do not know that we should take time to go over it, but I have rye at present growing between trees, with a view to plowing it down and turning it into potatoes. I have put this rye in on the authority of Dr. Hunt, and I should be glad to have some help on it.

DR. HUNT.—I happened to overhear the chance remarks of Prof. Surface regarding the rye cover crop. I think I can hazard a guess why Mr. Hartman has been getting bad results from his rye crop, by a little experience of my own. Several years ago I took a twenty-acre field which had been in corn, and put about sixteen acres of it in rye. The rye was put in in the spring, to make a soiling crop; thus I got two crops in one year; I got the corn and I got the rye. Then I planted the twenty acres in corn again; it happened that the rows ran diagonally, and it was just like jumping off the precipice; you could see so plainly the difference between where the rye had been and where it had not been. Where the rye had been we got sixteen bushels of corn to the acre; where there had been no rye we got forty-nine, so it showed that it was not good to get too ambitious, and try to raise too much. Then, too, that season there was only twenty-eight inches of rainfall in that locality. I have found that in the course of one season the ordinary crop requires about twenty-eight inches of water. Now, the rye had pumped that water out of the soil, so that when I came to plant the second crop, there was no water there for it. If it had been an extremely wet season, I might have grown a better crop, or if I had planted it the first thing in the spring, before the rye pumped all that water out of the ground, I might have had a better crop of corn. Now, this may not have been the case in Mr. Hartman's field, but it is possible that it was plowed down so that the water could not come up, and in that way the bad results may be due to lack of sufficient moisture.

MR. HARTMAN.—I have no doubt that the points the doctor makes are correct in themselves, but the trouble I have had was having poor crops following rye plowed down as early in the spring as possible. The rye had made a strong growth in the fall, forming a good sod, then turned down, and followed with harrow and roller, making sure that the communication with subsoil moisture was complete. The soil had been limed, about twenty-five bushes to the acre, to make sure that the rye would not make the soil acid; and yet it has always been my experience that rye that was allowed to grow up and then mowed for straw, and the stbbule plowed under makes the very best truck land I have.

I can't give you the number of the bulletin now,—can you give us the number of it, Doctor?—which tries to prove that the majority of farmers could get as good results from floats as from acidulated rock. There is a record, of rye plowed in, and crimson clover plowed in year after year, and the rye proving injurious to the following crops of corn, giving the reason that the Doctor has laid down, but my experience has been that it is always injurious to truck crops, and it may be to fruit crops.

DR. HUNT.—Just one thing I want to call Mr. Hartman's attention to; the land that had been planted in rye which was then turned in, and reduced the yield to sixteen bushels per acre, had been planted in corn the year before, and had produced two crops that year.

The bulletin he has reference to is not issued by the Pennsylvania Department, if I remember correctly; it is a bulletin issued by Dr. Patterson, of Maryland Experiment Station.

MR. HARTMAN.—No; I think it is a Pennsylvania bulletin.

There is one thing that I should make clear. The soil was not lacking in fertility, as the Doctor's remarks would suggest; I had used fertilizer on it, from half a ton to a ton per acre, analyzing 5-8-10; this should give pretty good results.

A MEMBER.—I understood Mr. Hartman last year to say that he recommended the use of rye as a cover crop.

MR. HARTMAN.—I have found that it is not wise to jump at conclusions. When I began to truck on that farm about eight years ago, I believed that rye was going to add to the fertility in the soil. It may do that the next year, but it is injurious the first year. How much of the improvement was due to the rye and how much to the use of fertizer I did not know. I was using from $35 to $40 worth of fertilzer per acre on some crops, and I could not understand occasional poor crops; then, last year, one-half of my corn was grown in a field that was in rye, and alongside of it was corn that was not grown on rye sod, and you could easily see where it began. Then I harked back one year to when I had a tomato bed grown in rye sod. Those tomatoes just hung round, about two weeks later than those of the rest of the market gardeners', and I began to think some of the trouble must be due to the rye.

THE PRESIDENT.—This is very interesting, but we are getting away from our subject—the report of the General Fruit Committee; we will get back to the discussion of that.

MR. TYSON.—Just a word in regard to the use of rye as a cover crop. I have had some experience with rye in orchards, without any deleterious effects. I have one case in mind where there was a good deal of twig blight. The orchard was set in low ground, where something was needed to prevent erosion; that orchard was sowed in rye, and the result appears to be better than with the ordinary farm crop of clover after it had been plowed down, and this experience was supplemented by four or five years' experience in York county in this matter.

DR. MAYER.—We plowed down our first rye in '81, I think it was, and we have in all this time our first bad effects to see from it. It appears to furnish more humus than almost any other crop we can get, and in that way we can secure and hold more water in the soil to benefit the late development of the fruit crop.

PROF. SURFACE.—What was the age of the rye when plowed down?

DR. MAYER.—The rye was about three to four feet high, most of it, and the men had to break it before they could get it down.

PROF. SURFACE.—About getting into bloom?

DR. MAYER.—Some of it got into bloom, and more than bloom.

MR. McSPARRAN.—If the rye is all threshed out, I would like to say that in all my experience in attending these meetings, I have never heard a report that struck me as as complete, as instructive, or as profitable, as the one we have just heard, and are now discussing. Some of the remarks have been German to the subject rather than "germane," but the fact remains that it was a most excellent report.

MR. KNUPPENBERG.—I would like to make a few remarks in regard to the subject of painting trees with whitelead. I undertook that experiment myself, making sure that the whitelead was all right, and I cannot see anything wrong with that orchard now. Another man took some commercial paint and used it on his trees, and in a few weeks it was very plainly evident that it was the wrong thing.

Regarding the matter of spraying where there was no scale, I took that up a few years ago, and find it very beneficial. I always spray twice for the codlin moth, and my orchard was the comment of the county for the quality and quantity of its fruit.

MR. GOOD.—Does the adopting of this report discharge this Committee?

THE PRESIDENT.—No; the Chairman of the Fruit Committee is appointed every year, and when he is a good one, he is generally re-appointed.

MR. GOOD.—I was going to suggest that this gentleman has done his duty so well that if it is in order, I would move that we extend him and his assistants a vote of thanks.

THE PRESIDENT.—We will make it in order. Does anybody second that motion?

The motion was seconded and adopted unanimously.

MR. TYSON.—I thank you, gentlemen, but I am glad to say that most of the thanks are due to the gentlemen who made it possible for me to give you this information. The responses came in very promptly to me, and made it easy for the Chairman to do his work.

THE PRESIDENT.—A few days ago I received a letter from a gentleman whom I had been accustomed to see at our horticultural meetings a number of years ago, when I was quite a young man. He wrote to me that we met in Lancaster thirty-one years ago, and that he was then one of the officers of this Society. Of late years we have missed him from our meetings, but we have heard from him in other lines. Of this man, who has been engaged in fruit culture or other agricultural lines all his life, it has been said, that his name stenciled on a package was a guarantee of quality. He is with us this morning, and I would like to have a word from him. His name is John I. Carter, of Chester county. We would would like to have a

word from you, Mr. Carter. We are anxious to know whether we have made any progress.

MR. CARTER.—As the young woman said, "this is so sudden." Mr. Chairman and gentlemen: I am asked whether you have made any progress in the last thirty-one years, when I met with you in this town last. When I look at this large gathering of fruit growers assembled here, I would say most emphatically "yes," and the fruit exhitibed here also shows evidence of progress in the number of varieties and beauty of appearance. At the close of this rather remarkable season, our people all over the State say that they never had a finer, or a more bountiful crop; this is not due to the fact that we have better or finer apples, but we did not have so many growers.

When I look over this audience, and then look back over these many years, I cannot help but feel a certain degree of sadness, to see so many of the old familiar faces missing from their places at this meeting. Men like Henry M. Engle, Thomas M. Harvey, Dr. Eshleman, Cyrus T. Fox, Judge Stitzel, and many others are no longer with us. These were fine old men, interested not only in horticulture, but in every feature of agriculture which the people of this county pursued. Sometimes they made mistakes. In looking back over the meeting of thirty-one years ago, I remember that some of them took exception to asking the State for aid in the matter of our forestry growth. That was a mistake. We have found that the decline in our forests has been injurious to the farmers of this country, and we all feel like encouraging the State Legislature in the matter of preserving our mountain regions. We are suffering from a scarcity of lumber and timber, and the results brought about by this scarcity. We can go even further than encouraging the Legislature. We can and should all do something to encourage tree planting along our roadsides, and along the waste places on our farms, and the growth of nut trees in our pasture lands. We all have large pasture lands where the walnut, the shell-bark and the pecan would do well, and not damage the pasture. They would be of great value to the owner and to the country in general.

The United States is a great country; one section raises fruit of one variety; another section raises a different variety, and that is true not only in the different varieties of a fruit, but of the fruits themselves, and we send our fruits and our products into the larger cities without diminishing the quantity or the demand for them. What we need to-day all over the United States is a united company of fruit growers who, when they can raise a good variety of fruit in one section, will be satisfied to raise that, and allow the grower in another section to grow a different variety. This is a great country, and exchange, rather than competition, is the means of inducing the growers to endeavor to improve the fruits best adapted to their sections. I did not expect to be asked to speak, Mr. Chairman, and you will excuse me for not having anything better to say.

THE PRESIDENT.—Is Prof. Stewart in the room? We will be very glad to hear a few words from him. This is not Prof. Stewart's regular address, as announced on the program, but a special announcement he wishes to make.

PROF. STEWART.—Mr. Chairman, Ladies and Gentlemen: I

don't want to take you away from this valuable discussion that is going on, but we are all at work on this apple problem, from a little different viewpoints, perhaps, but all tending toward the same end. I want to explain a little concerning one of the things that we are trying to do at State College.

We hear a good deal now-a-days about the improvement of wheat and corn by selection of the best strains, and about raising the standard of our animals by selection of the highest types for breeding purposes. Now, we wish to apply the same principles to the apple in this state. Of course, we recognize the different methods of reproduction involved and realize that the value of selection in improving races propagated like the apple has not yet been entirely demonstrated. But we believe it worth trying. It is one of the possible resources of the progressive orchardist and should not be left unworked.

It not infrequently happens that a single tree of a standard variety does much better than any others of its kind in that neighborhood. For example, in Southern Pennsylvania, where the Baldwin as a rule is unprofitable on account of the early dropping of its fruit and leaves, an occasional tree is found which is entirely free from these faults. This tree may indicate the way to get Baldwins that will be profitable in our southern sections.

It also is not at all rare in this State that a local variety seems to outdo all others in its section, and we hear the owner and all his neighbors extol the merits of that apple. These may very well be actually the best varieties for use in that section. It is from such beginnings that practically all our best fruits have come, and it has been only through the action of thoughtful fruit growers in recognizing the value of strains or particularly good individuals and propagating them, that many of our present varieties have been preserved.

This work of improvement has not all been done. There are most probably in Pennsylvania to-day individual trees or local varieties that, if properly chosen and propagated, would prove of more value to growers in this State than any trees now on the market. It is to these better individuals or varieties that we wish to call the attention of all earnest apple growers. We ask your co-operation in locating such trees and in enabling us to get scions for further testing. We want scions of any trees or varieties that seem especially good for Pennsylvania. Along with them we want all the local information concerning the varieties that is available.

We give herewith a list of varieties of apples of Pennsylvania origin, selected from a list of those that have appeared in publications up to 1904, together with abbreviated descriptions. Persons knowing the behavior of any of these varieties in their localities are requested to *communicate with the Department of Experimental Horticulture at State College.* Especially should we like to know which of these are sufficiently promising for further attention and where we can obtain scions from particularly good trees of the same. We must unite the efforts of all interested in apple growing and its betterment, if anything really useful is to be accomplished, and each unselfishly must contribute to the good of the whole.

On the cards that are being distributed, I would like you to write your names and addresses. Also, kindly state on them the names of the varieties that you have found to be especially good in your locality.

APPLES OF PENNSYLVANIA ORIGIN.

(From Bul. No. 56 B. P. I.)

Name of Apple.	Form.	Size.	Color	Color. of Flesh.	Flavor.	Quality.	Season.
Adams,	*robl	l	rs	.....	sa	vg	vl
All Summer,	ob	s	yb	w	sa	vg	me
Austin,	rc	m	ru	.....	s	g	ml
Baltzbey,	rob	l	yb	w	s	g-vg	m
Belmont,	roblc	ml	y	y	msa	vg	ml
Benninger,	.....	ml	gyrs	y	sa	g	m
Boas,	obr	m	gyrs	wy	psa	vg	l
Brimer,	obc	m	wyb	w	sa	vg	l
Brown,	ob	m	yrs	y	sa	vg	m
Bush,	obc	ml	yb	w	msa	vg	m
Butter,	r	ml	y	w	rvs	g	m
Carver,	r	l	gy	y	sa	g	e
Clark,	obc	ml	wb	w	sa	g	ml
Cocklin,	rob	ms	wcb	w	sa	vg	m
Columbian,	obc	m	yrcs	wy	sa	vg	m
Cornell,	oblc	m	yrc	w	sa	vg	e
Creek,	obc	m	gyrs	w	psa	vg	l
Dickinson,	roblc	ml	.....	.....	sa	g	l
Dickson,	rc	vl	yrs	.....	bmsa	vg	l
Doctor,	rob	m	yrs	.....	bsa	g	ml
Early Red Sweet,	r	m	.....	.....	s	.....	me
Early Ripe,	rob	m	py	w	sa	g	me
Evening Party,	ob	ms	yrs	w	sa	vg	ml
Fallawater,	rc	vl	ygb	gw	pmsa	g	ml
Fanny,	robc	l	drc	ws	sa	vg	me
Franklin (Ill.?),	rc	m	py	y	msa	vg	ml
Fremont,	rc	m	pyc	w	bsa	vg	l
Gerard,	obc	l	yrsc	yw	sa	vg	m
Golden Spy,	robc	m	py	w	sa	vg	vl
Hiester,	rob	m	yrs	w	psa	g	l
Hopewell,	obc	s	yru	y	bmsa	vg	vl
Housum Red,	rob	m	yrs	w	sa	vg	l
Hughes,	r	l	gyb	.....	msa	vg-b	vl
Hunter,	r	ml	rs	.....	sa	vg	m
Imperial Rambo,	ob	m	wyrs	w	sa	vg	ml
Irish Pippin,	robc	ml	wrs	w	sa	vg	m
Jefferis,	obc	m	yrcs	w	rmsa	vg-b	me
Keim,	ob	ms	py	w	bsa	vg	l
Knowles,	rob	s	pgyrs	w	sa	g-vg	e
Knox,	rc	ms	ygbru	y	sa	g-vg	ml
Krauser,	rc	m	wyrs	w	sa	g-vg	l
Lacker,	ob	m	rsc	w	psa	g	ml
Lancaster Greening,	robc	m	gyb	y	psa	vg	vl
Large Golden,	r	vl	gy	y	sa	vg-b	l
Lehigh,	rob	vl	yg	gy	sa	g	vl
Longstem (Pa.),	robl	ms	yrs	w	sa	g-vg	ml
Major,	robc	l	grs	y	rsa	vg	vl
Minkler,	robc	m	gyrs	y	sa	g	l
Morris Sweet,	r	vl	yrs	.....	s	vg	l
Newville,	.....	.....	.....	.....	.....	vg	ml
Northampton,	ob	m	wyrs	w	sa	vg	ml
Paul,	ob	.....	rs	.....	sa	vg	ml
Pen,	robc	l	yr	y	sa	vg	l
Pennsylvania Wine,	obc	l	yrs	yw	sa	g	ml
Polly,	oblc	ml	gyrs	.....	.....	vg	l
Powell Beauty,	.....	ml	.....	.....	sa	vg	me
Queening,	r	ms	yrs	w	sa	.....	me
Rambo,	rob	m	ywrs	gw	rmsa	vg	m
Red Seek-no-Farther,	ob	m	gyrs	wg	sa	g	ml
Reist,	r	l	y	.....	sa	vg	e
Republican Pippin,	ob	l	yrs	w	psa	g	m
September,	rc	l	y	y	sa	vg	m
Sheriff,	rob	ms	pyrs	w	sa	g	l
Smith,	robc	ml	yrs	w	pmsa	g	ml
Smokehouse,	rob	ml	yrsc	y	sa	g	ml
Sprang,	rob	l-vl	gy	yw	sa	vg	l
Springhouse,	obc	ml	gyrs	yw	sa	vg	l

Name of Apple.	Form.	Size.	Color.	Color of Flesh.	Flavor.	Quality.	Season.
Staudt, ...	rc	l	rs	w	sa	vg	ml
Strode, ...	oblc	ms	y	y	sa	g-vg	m
Sum'er Bellflower (Pa.)	oblc	l	y	yw	sa	g	me
Summer Paradise, ...	rob	l	pgyb	.....	s	g-vg	.....
Sweet Winesap, ...	obc	m	rc	.....	rs	g-vg	l
Switz, ...	obc	m	gybr	yw	sa	vg-b	l
Townsend, ...	obc	m	pyrs	w	sa	g-vg	me
Vandervere Pippin, ...	obc	vl	yrs	w	a	g	ml
Wabash, ...	roblc	l	yrsru	w	bsa	g	m
Walker Beauty, ...	.....	vl	ycr	.....	sa	vg	l
Water, ...	roblc	m	yb	w	psa	vg	m
Watson, ...	ob	m	gwrsc	wy	rsa	vg	me
William Penn, ...	robc	m	yrs	y	psa	g-vg	l
Winter Blush, ...	oblc	m	yb	w	sa	vg	l
Winter Paradise, ...	rob	l	gyb	w	s	vg	l
York Imperial, ...	roblob	m	wcs	y	sa	g-vg	ml
York Stripe, ...	rc	ml	wyrs	w	bsa	g	l

EXPLANATION OF ABBREVIATIONS.

Form—c, conical; o, oval; ob, oblate; obl, oblong; r, round.
Size—l, large; l-vl, large to very large; m, medium; ml, medium to large; ms, medium to small; s, small; vs, very small.
Color—b, blushed; c, crimson; d, dark; g, green; l, light; p, pale; pu, purple; r, red; ru, russet; s, striped; w, white; y, yellow.
Flesh (color)—g, green; s, stained or wine colored; v, very; w, white; y, yellow or yellowish.
Flavor—a, acid; b, brisk; m, mild; p, pleasant; r, rich; s, sweet; sa, subacid; v, very; vi, vinous.
Quality—b, best; g, good; g-vg, good to very good; p, poor; v, very; vg-b, very good to best.
Season—e, early; l, late; m, medium; ml, medium to late; v, very.

A MEMBER.—There is a tree on my farm, which is supposed to be a seedling; it was there when I bought the farm; I named it for the township I lived in—the Salisbury. We commence using them in August, and use them until about April. Unfortunately, this year we did not pay much attention to them, and have none in the cellar, but I can furnish scions of the tree.

PROF. STEWART.—This shows what generally happens when attention is called to the better apples of local origin. Nearly every time I call attention to anything of this kind, some one tells me that there is a kind of apple on his farm or in his locality that is exceptionally successful. We are not anxious to increase the number of varieties, but we do believe that it is well to bring out varieties of high quality.

If you can furnish us with any information regarding them, it will be greatly appreciated, and eventually, we trust, will be of service to the entire body of fruit growers.

MR. TYSON.—Professor, do you want the name, and address of every member, with the number of his trees, whether he has any scions or not?

PROF. STEWART.—I shall appreciate it if you include that; I should like to get in touch with all fruit growers in the State.

A MEMBER.—But what, Professor, if you don't know the name?

There is a tree on my place that bears a very fine apple, but no one knows where it comes from. It is something like the Duchess of Oldenburg, but of finer color.

PROF. STEWART.—I don't care so much for the names as I care for the fruit; if you can send to us say half a dozen samples of the fruit, we may be able to determine whether it belongs to any recognized variety or not. Occasionally people send us samples that they consider seedlings, but which belong to an already established variety.

MR. BRINTON.—If there is any time, I would like to say something. Up at Danielsville, N. Y., they raise a fine Winesap, which they call Murrow's Strain, which was originated by George E. Murrow, in Bedford county, Virginia. The grower simply took some of the best strains and planted them in his orchard. They are the only Winesap grown in that vicinity, and are very fine. Now, I only want to ask the Professor whether strains like this would improve an orchard?

PROF. STEWART.—Most likely, though we cannot say surely. That is what we are trying to solve. We are not trying to get more varieties, but to determine whether we can improve the varieties by selection from especially good trees. It is not a thing that has been demonstrated as yet.

MR. BRINTON.—I think it is well worth the consideration of Pennsylvania fruit growers, and also New York, especially in the mountainous regions. My experience with the Winesap and Northern Spy has been very poor as compared with those in Virginia. It may be due to the soil and location.

PROF. STEWART.—It may be; it also may be due to variations in the trees. It is a well-known fact that trees propagated simply by buds are liable to variation. In the seedless orange there are varieties that have been developed by propagation of bud variations. Last fall at Ithaca, N. Y., among a lot of Baldwin apples in the Sage Dormitory, there was one that looked like any other Baldwin, but when it was cut across, the knife went straight through, as if we were cutting so much cheese. That is, it was a coreless as well as a seedless apple. There were a few core lines about the place for a seed vessel, but there was absolutely no trace of either seed or seed vessel. Now, if that apple could have been traced to the twig which bore it, there was a chance to revolutionize the apple business. The chance would depend upon whether or not the twig would do the same thing again. In improving apples we have to take into consideration internal or hereditary influences as well as outside culture. As I have said, this is a point we are at work on, and if you can give us any assistance whatever, it will help to further the movement.

MR. BRINTON.—Now, if what you are bringing out proves to be beneficial, I would like to go right over to Mr. Murrow's orchard and get some buds from that tree; I'll tell you why; he told me the second year that I was there that I had ruined that tree by over-

pruning, but the following year it had a better crop of apples, and looked better than ever before. I am simply asking your opinion, and trying to bring out this point.

MR. W. P. BRINTON.—When you get that high condition, how are you going to make it stay there? If you withdraw that high culture condition it will go back to its natural condition, will it not?

PROF. STEWART.—That depends. After we get the seedless orange it does not revert to the older and less valuable sort. This is done by propagating from bud variations, and the question is whether we can do the same with apples. If we find the variations we will try to take advantage of them.

MR. W. P. BRINTON.—Is it not a fact in horticulture that the only method we can depend on to produce new varieties is cross-pollenization?

PROF. STEWART.—Hardly. You know that bananas, for example, are never pollenized, and we have a number of different varieties, so they can originate in other ways.

MR. GOOD.—Would it not be a good idea to go back to the original tree and get scions to see if they were as good as the first ones were?

PROF. STEWART.—Possibly; but I am inclined to think that we would better stick to the trees that are here in Pennsylvania.

THE PRESIDENT.—I am sorry to announce that Mr. Kains, who was announced for the next number on the program, has been unavoidably detained, and will be unable to be present with us.

I have the following committees to announce:

Committee on Exhibits and Nomenclature: D. L. Hartman, C. P. Scholl and Josiah W. Prickett.

I hope these gentlemen will go to work immediately after this session. There is a good deal of work to be done, and we would like to have the report early to-morrow morning.

I will also appoint the following Committee on Resolutions: Mr. W. F. McSparran, Mr. W. P. Brinton and Mr. John D. Herr.

THE PRESIDENT.—The next thing on the program is new business. This, it seems to me, would be a good time to receive suggestions for the next place of meeting. We really have more time now than we will have later on.

MR. SCHOLL.—Is it not customary to meet in Harrisburg next year? I would move that we meet there as has been our custom.

MR. ELDON.—I think that it is customary for some of the other agricultural societies to meet at Harrisburg next year, and if we could arrange to meet about the same time, it might induce the Legislature to take some notice of our horticultural interests. I hope our members will be careful to vote only for men who will look after the interests of this branch of agriculture, which is beneficial to so many.

PROF. SURFACE.—I, of course, will be heartily in favor of meeting in Harrisburg next year, and I endorse Mr. Eldon's remarks about meeting at the time the Legislature is in session. I believe if we meet while they are in session we might be able to induce many of them to take some interest in our work, and in our meeting, and I think it would be advisable to change the date of meeting so as to meet during the session of the Legislature.

THE PRESIDENT.—Our time of meeting is fixed by our By-laws. I recognize the value of the point which Mr. Eldon has brought up. The mere fact of our meeting at Harrisburg will not do any good unless our friends try to use their influence with the Legislature. I know that in other States the Horticultural Societies are supported by the Legislature, but since our Department of Agriculture was organized, we are practically shut out; we receive some help through the Department, but there are so many other interests to look after, that we fall short. I think it would be well to try to impress on our legislators the importance of using their influence in our behalf.

MR. CARTER.—I don't want to make any suggestions as to the place of meeting, but I would simply like to suggest that two years hence will be the fiftieth anniversary of this Society. I think it was organized in 1860, and 1910 will be the semi-centennial. Would it not be well to remember it in some manner?

THE PRESIDENT.—This is the forty-ninth meeting; the next meeting will be the semi-centennial.

MR. CARTER.—I would suggest, then, that the next meeting be held here because the first meeting was held here.

MR. McSPARRAN.—I am sure that Lancaster and Lancaster county would be all delighted to have you meet here again next year. Harrisburg is all right so far as it goes, but it is not so good as Lancaster. We may not have the fine building up on the hill to look up to, but I think it would be a good time for Lancaster to whoop herself up. I believe I voice the sentiments of the members from Lancaster when I invite you to come here.

A vote was taken, which resulted in a division, whereupon a rising vote was called for by the President. This showed the majority to be in favor of meeting at Harrisburg next year, which place was finally made the unanimous selection of all present.

MR. McSPARRAN.—Mr. President, it is absolutely necessary for me to go back home at 8.30 this evening. I cannot possibly be here to-morrow. Will you kindly appoint in my place, for Committee on Resolutions, a better man?

THE PRESIDENT.—We can't appoint a better man, but we will arrange to relieve you. I will ask Mr. Chester J. Tyson to take Mr. McSparran's place on said committee.

MR. McSPARRAN.—There is considerable fruit here that will not be taken away, and I have spoken to a lady here at Lancaster, Mrs.

W. W. Griest, who says they will be glad to receive it at the various charitable institutions here. There is a great deal of charitable work done here, and I think it would be well for us to donate the exhibits here to these institutions. They will arrange to have a man call for the fruit if we are willing that they should have it.

THE PRESIDENT.—I suppose that will be satisfactory to the members; those who wish to take their fruit away can arrange to do so.

I want to call attention to the program this evening. I am sorry that your Chairman will be unable to be with you, but you will have a most excellent program without him. Dr. Hunt will tell us what they are trying to do up at State College in the way of horticulture. That is something in which we are all interested, and we are trying to get into closer relation with State College and the Experiment Station. We want to know just what Dr. Hunt is going to do, so that we may hold up his hands. After that you will have an illustrated lecture by Prof. Surface.

If there is no further business, we will take a recess until 7.30 this evening.

PROF. SURFACE.—May I announce to my demonstrators that I would like to meet them in this room at 6.45 this evening? Also, I would like to have a few of my assistants help me to put up the screen.

Adjourned.

TUESDAY, JANUARY 14.—EVENING SESSION.

Mr. Eldon in the Chair.

THE CHAIR.—The first number on the program is the Annual Address of the President, which, in his absence, will be submitted in writing and filed for publication.

PRESIDENT'S ANNUAL ADDRESS.

In looking back over the year that has passed since our Harrisburg meeting, I see many things that encourage me as a fruit grower, and as a member of this Society.

We have had a very profitable season, our orchards and vineyards have produced a splendid crop of handsome fruit, which found a ready market at fair prices.

The scarcity of fruit in many other sections induced buyers to come to Pennsylvania, who would not otherwise have done so. As a consequence, Pennsylvania fruits, especially apples, have been distributed over this country as they have never been before, and the men who bought our fruit this year will come back again for more.

Some of the remedies that have been used for the control of scale have proven effective, and the reports come from all sections that the orchards are in much better condition than they were at this time last year.

The advent of the San José Scale frightened many orchardists into studying the spraying problem, and after they had secured the proper

machinery to spray for scale, we find the great majority pruned and cleaned up their orchards and sprayed also against the codling moth and fungous diseases. As a consequence we never had in Pennsylvania as many carefully sprayed, intelligently cared for orchards as we had this year, and we never had as uniformly good a crop of fruit.

This excellent crop of fruit and the ready market that it found, added greatly to the popularity of the county horticultural societies. We find that they all report increase of membership and a much greater interest in the work of the societies; plans for more extensive planting have been arranged for next spring, and in every case we find these plantings will consist of a very few varieties that seem to be specially adapted to the particular locality.

The investigations in horticulture by Prof. Stewart, under the auspices of the State Experiment Station, have been fairly started, and will very soon begin to show results. The State of Pennsylvania is to be congratulated upon the public spirit manifested by the orchardists of the State in offering their hearty co-operation and the use of their land for these experiments free of cost. In this age of graft and extortion, it is refreshing to find one set of men who are willing to do something for the public good without special gain to themselves.

The Horticultural Department of State College has been re-organized and every facility will be afforded for the study of horticulture in all its branhces, including market gardening and the management of greenhouses, hot-beds and cold frames. A commercial market garden and small fruit project will be started in the spring, so that the students can pursue their studies from a business standpoint. This department will be in charge of Prof. R. L. Watts, the ex-Chairman of our General Fruit Committee, with whom most of you are acquainted. He is a thorough scientist, an excellent teacher, and at this time one of the most successful market gardeners in Western Pennsylvania. I feel that we are exceedingly fortunate in securing his services. In this connection, the most hopeful sign, to my mind, is the fact that a number of young men are already enrolled in this course, with the intention of taking charge of the home farm.

While congratulating ourselves upon the bright prospects for horticulture at State College, we cannot forget the great loss the college and our Society has sustained in the tragic death of Prof. Geo. C. Butz, who was cut down in the midst of a useful career. He was an authority on all horticultural matters; he was justly popular in every county of the State where he lectured at Institutes, because of his accurate knowledge of his subject, his untiring industry, his modest, unassuming manner, and his genial, kindly nature, which endeared him to every one who knew him.

And now, what can we say for the year upon which we are about to enter?

Each grower should have a definite, distinct idea formed in his own mind as to what special results he wishes to secure; what kind of trade he is going to cater to, and always work towards this one end. If you will go persistently after a particular line of trade, study its needs, and do your best to supply them honestly, you must succeed—failure is out of the question.

We should encourage the association or community spirit in our work. When we go into the general market we find the different

interests co-operating against us. The railroads agree together as to the rates they will charge for carrying our produce to and from the distributing centers. The commission men agree as to the rates they will charge for selling, and where they find men working single-handed, they fix the price at which they must sell. When the men of a certain district work together, study business methods together,study the crop and market reports together, and stand together for a square deal, they will get it. I am glad to be able to say from personal observation, that this community spirit is growing, and where it is most pronounced we find the most enthusiastic fruit growers, the best citizens and the happiest families.

To the young man who is about to start in business for himself, and contemplates planting orchards, I would say, don't allow your fondness for large operations to induce you to undertake more than you can well perform. I have always been a strong advocate of the little farm, well tilled. My experience and observation, extending over a period of more than thirty-five years, has taught me that a few acres judiciously planted and properly cared for, is much more profitable than the large farm poorly cultivated and the crop carelessly handled. In conclusion, I wish you all a prosperous and happy New Year.

THE CHAIR.—The next number on the program is an address by Dr. Hunt.

HORTICULTURAL ADAPTATIONS.

BY THOS. F. HUNT, Dean and Director of Agriculture and Experiment Station, State College, Pa.

Although my father was something of an orchardist and a great lover of trees, my own experience, especially in later years has been along the lines of more extensive agriculture. I cannot, therefore, speak with any authority upon the details of horticultural operations. As the director of your Agricultural Experiment Station, however, I have to consider your problems in their broader aspects. You have, as I see it, a couple of large questions which need working out if Pennsylvania is to take the place in fruit raising and vegetable gardening that her natural conditions warrant. Some persons will doubtless say that the discussion which follows has failed to mention the most important question in fruit raising, namely, the marketing of the crop. I do not wish to underestimate the importance of barter, but the most important element of success is the economic production of a high-class article, whether it is the apple, iron or broadcloth. The people of this nation have gone wild on the subject of barter. If the men who have amassed fortunes in selling cheap, spurious or adulterated articles had spent the same energy in studying the economic production of a high-class one, they might possibly have made as much money and saved their souls at the same time. At any rate this country would have been spared the expense of an army of detectives to enforce the pure food and similar laws.

The Pennsylvania Agricultural Experiment Station has a moderate sized poultry plant. Apparently, the only cause for locating the buildings and yards was the fact that it seemed convenient to locate them along a roadway leading from the station offices to the station

barn. The station barn was located in its present position because a side hill barn was desired, and the station office building was located doubtless to give a sightly outlook. Obviously, these factors have nothing to do with raising poultry and now experts tell me that our poultry work, if not a failure, is at least handicapped owing to the fact that this accidental location is unfit for poultry and is causing us to work against nature.

The location of most family orchards and some commercial ones is equally accidental. How many orchards in Pennsylvania have been located with reference to the farm buildings. Few men have deliberately studied the soil and climatic adaptation of different parts of their farm, but they just planted an orchard where convenience, generally in relation to the dwelling, has indicated. Some brilliant successes in orcharding and many dismal failures have been due to the accident of placing the right or wrong kind of variety of fruit on the right or wrong soil, yet it is now known that in the same orchard part of the land may be adapted to Baldwins, another part to Rhode Island Greening and so on. The point is that if orcharding is to take a large place in Pennsylvania, and I believe it is possible to put this great Commonwealth at the head of the column, both in the yield and quality of apples, at least, then a systematic campaign of education must be begun by this Society and all other agencies designed to better the fruit industry of the State, to teach people that commercial orcharding should be restricted to those sections where, by virtue of soil and climate, man is aided by nature in the production of apples and other fruit. Not only so, but people should generally recognize the necessity of adapting the kind of fruit, or even the variety, to both soil and climatic conditions. We must even go farther and recognize that certain varieties require different treatments. A friend suggests that in planting an ordchard the following plan be followed:

1	2	1	2	1
3	4	3	4	3
1	2	1	2	1
3	4	3	4	3
1	2	1	2	1

In the above outline each number represents a variety of apples. If we suppose each tree was planted, say twenty feet apart, each way, then, ten years later, when it was decided which one of the four varieties was best, considering yield, quality and market conditions, the other three could be removed. It is evident that it would make no difference which variety was left, as the trees of every variety are exactly the same distance apart. Now, my friend has pointed out one objection to this method which he deems rather serious. How serious I must leave it to the expert to decide. He says that in his own experience different varieties of apples require different strengths of sprays, and that if four varieties were thus interspersed one might find difficulty in getting the best results in spraying. I bring this question up here only as an illustration of the possible adaptation of varieties or kinds of fruit to methods of management.

While the adaptation of present well-known varieties of fruit to different climatic and soil conditions is the first and probably the most important subject in promoting fruit raising, yet it is possible to go a step further. The Pennsylvania Agricultural Experiment Station is

about to plant a large orchard on Hagerstown clay loam. It wishes to grow three varieties of apples. Who can tell us what three varieties to grow? Since this soil type is seldom used for commercial orcharding we have little knowledge of the varieties adapted to it. It is entirely possible that there is no well known variety of apple adapted to this soil type, at least when raised upon commercial scale, but it is possible that some obscure variety may be found which would outrival any known variety, or it may be that it would be possible to create a variety better than any yet known for this purpose. This illustration has been given to show that there lies before our door great opportunity to discover or create varieties adapted to special soils and climates. The people of this country have been in the past few years, made quite familiar with the work of Luther Burbank. It does not detract one iota from that work to call attention to the fact that Burbank's creations so-called are of little value usually to the horticulturists of the east, because of differences in soil and climate. The very fundamental laws that permit him to do what he does in large measure prevents his work from being of practical value to eastern horticulturists. What he has done is to call attention to what it is possible to do for each locality, and then each locality must work out the problem for itself. While the creation of new varieties of fruit may be dealt with in some measure by the experiment stations, it is a line of work peculiarly adapted to individual effort and one that this society can wisely promote as such.

While I hesitate to make suggestion as to practical details to the members of this society, there grows out of the idea that certain varieties have certain soil and climatic adaptation the need of greater care in the selection of stock. The time has come, in my opinion, when no apple grower should buy a variety of apple for planting but the orchard should be planted from some suitable stock such, say, as Northern Spy, and afterwards top grafted from carefully selected scions, preferably from trees grown under the same soil and climatic conditions. Not the least of the arguments in favor of this practice is the positive knowledge that when the trees come into bearing they will bear the variety of apples expected.

There is still another step in the study of horticultural adaptation. If certain soils are adapted to the raising of certain varieties of fruit or to a particularly high yield or quality of a particular variety of fruit, then there must exist certain conditions in that soil which brought about the results. Granting this, we have only to discover these conditions and bring about the same conditions in other soils in the same climate to get the same yield or quality. This may sound simple to the uniinitiated, but every person who has ever turned a furrow knows it is not.

A year ago last December, at the suggestion of two horticultural societies of this State and upon the recommendation of the Director-elect of the Station, the Board of Trustees of the Pennsylvania State College set aside $1,800 of the Adams fund for the fiscal year ending June 30, 1907, and later set aside $2,700 for the fiscal year ending June 30, 1908, for investigations in horticulture. At the annual meeting of the State Horticultural Society last January the speaker consulted with members of your Society and it was decided that the most important subject for investigation with this fund at this time would be the causes which affect yield and quality in apples. On

April 1, 1907, Professor John P. Stewart was elected to take charge of this investigation. In a circular, which was issued at that time, it was stated that "so broad a subject and one involving such fundamental questions will be a long-time experiment and can only be accomplished by the most cordial co-operation of the orchardists of the State in whose orchards these investigations must be conducted, if the questions involved are to be settled. Just what phases of this general inquiry will be taken up first will not be decided upon until a study of orchard conditions within the State has been made, but the following points have been suggested and are under consideration: (1) influence of commercial fertilizers and barnyard manure, (2) influence of cultural methods, (3) effect of types of soil, (4) influence of climatic conditions, including elevation and exposure, (5) effect of scions from different trees, and (6) the influence of amount and time of pruning. The influence of fungous diseases and insect enemies will not be overlooked, although they may not be made the subject of immediate investigation."

Definite experiments on two phases of this general inquiry were started last spring, three on the effect of fertilzers and four on the effect of cultural methods. The experiments on fertilization are in operation in the following orchards: In Adams county, at Mr. E. C. Tyson's Floradale; in Franklin county, at Mr. D. M. Wertz's, Quincy; in Bedford county, at Mr. S. M .Brown's, Mann's Choice. They involve sixteen plots of ten trees each, thus comprising a total of 480 trees now under fertilization experiment. The cultural method experiments are in operation in the following places: In Franklin county, at Mr. J. H. Ledy's, Marion, and at Mr. John A. Nicademus', Waynesboro; in Bedford county, at Mr. Joseph R. Sleek's, of New Paris, and in Wyomnig county, with Mr. F. H. Fassett, Meshoppen. These experiments, with the exception of the last, comprise eight acres each and involve a comparison of the four leading methods of orchard culture, both with and without fertilization. Also, they compare each method as fertilized with barnyard manure versus commercial fertilizer. In all, seven experiments, covering forty acres, in four different sections of the State.

Pennsylvania State College has recently purchased 197 acres of land and has set aside something over twenty acres on which, in the spring, an experimental apple orchard will be planted, covering a number of phases of general inquiry above mentioned. It is expected also to establish additional experiments in other apple sections of the State. Careful observations are being made on the influence of types of soil and of climatic conditions by Professor Stewart. The most important work of this kind, however, is being done by H. J. Wilder, of the Bureau of Soils, who, during the past season has been making a careful study of the apple soils of the Appalachian region, from New York to Georgia. I mention this matter here in order to suggest that if you wish to have this work continued this Society should take suitable action to secure Mr. Wilder's assignment to this and adjoining States for next season.

In reporting to you on behalf of The Pennsylvania State College our stewardship in its relation to horticulture, I am compelled to report the loss of George C. Butz, Professor of Horticulture, by death, on Dec. 14, 1907. Professor Butz graduated from The Pennsylvania State College in 1883 and for about twenty-five years has served the

horticultural interests with all his powers. He was idolized by his students and beloved by all who knew him. This Society will, of course, take suitable action concerning his death.

I am able to announce the election as Professor of Horticulture, of Ralph L. Watts, Scalp Level, Pa. Professor Watts graduated from The Pennsylvania State College in 1890. He was at one time Professor of Hortitculture and Director of Farmers' Institutes at the University of Tennessee, but, fortunately for Pennsylvania, resigned from that institution to engage in commercial vegetable gardening and small fruit raising in Cambria county, where he has been unusually successful. His knowledge of the subject, his ability as a teacher, his acquaintance with horticultural conditions throughout the State, as well as in other States, make his appointment a particularly happy one. I thank you for your kind attention.

THE CHAIR.—We will now have an illustrated lecture on Orchard Pests, by Prof. Surface, the State Zoologist.

LIFE HISTORIES OF SOME COMMON ORCHARD INSECTS.

As a rule fruit growers and farmers recognize insects only in their most destructive stages, if at all, and in fact they more frequently recognize the destructive effects of the insects than the pests themselves. For example, it is not un-common for us to receive fruits or twigs speckled with red, sent with the supposition that they contain the San José Scale, because this pest often causes red spots in the tissues of the plant where it is found. However, such conditions may come from fungus diseases or other causes and do not always mean the presence of the San José Scale.

It is important for fruit growers to recognize the effects of pests on crops, because these are often conspicuous when the pests themselves can not be seen and in many cases they are so distinctive or characteristic as to make it possible to diagnose correctly the cause of injury, and thereby obtain the key to the application of proper preventives or remedies.

Destructive insects should be known in their different stages, and their life histories and places of living and places of concealment should be understood by farmers and fruit growers, in order that the pests can be attacked at their weak or vital points.

In speaking of the life histories or stages of our insects, it should be understood that we have two great groups of insects, classed according to the nature of their change of form or metamorphosis. The representatives of the first of these groups are said to have incomplete metamorphosis, or change, because the young resemble the parents in nearly every regard excepting that they do not have wings and are smaller. Also, they do not have a chrysalid or resting stage, and thus there are but three stages in their life history: The egg, the nymph or wingless young, and the adult or imago, which is represented by the winged form in all species having wings. The insects of the second group are said to have complete metamorphosis, as their change is more distinct, comprising four stages: the egg, the larva or worm-like stage, the chrysalid or pupal stage, and the adult or imago.

The insects do all their growing and often all their feeding in the

second stage, which is that of the nymph or larva. It is consequently in this stage that they are generally most destructive. They do not grow after the wings have developed, and many have no mouth parts fitted for taking food in the adult stage, and consequently can not feed in this last stage. Sometimes the injury by insect pests is done by the female in depositing her eggs, while the injuries by feeding are not conspicuous. The work of the Cidada or "Locust" is an example of this.

In the following remarks, insects will be discussed according to the plants they infest, but it must be remembered that some insects are liable to attack a great many varieties or species of plants, while others may be limited to but a few or even one only. When an insect like the codling moth is described under "Apple," this does not imply that it attacks no other fruits, and the description of its work or effects, for the fruit under which it is discussed is practically the same as for its effects on any other fruit or plant. If the description and name can not be found under one particular kind of plant, it should be sought under another, which it may also attack. Details of remedies have been published in previous issues of our Bulletins, and may be further published in the May issue.

APPLE PESTS.

Aphids or Plant Lice.—These are small, round-bodied, greenish insects, with two long antennæ or feelers, and a piercing mouthpart, by which they pierce the tissue of the leaf or growing twig and suck the juices, after having injected a saliva that is more or less detrimental to the tree. Plant lice belong to the group of insects without metamorphosis, and consequently they do not have a worm-like larval stage. The apple aphis remains during the winter in the form of black, shiny eggs on the twigs of the tree. At this time spraying with such insecticides as are effective in killing scale insects will destroy them. About the time the buds are bursting the young aphids hatch from the egg and commence to suck the juices from the new green parts. This is the best time to kill them by mild contact sprays, such as dilute whale oil soap, eight per cent. kerosene emulsion, tobacco decoction, or dilute soap washes of other kinds. As they feed on the undersides of the leaves, the infested leaves become deformed or twisted and curled in such a way as to form protecting places for the insects within, and sprays can not reach them. Consequently, after the leaves are curled, it is impossible to kill them by spraying, but if delayed until then the infested twigs may be bent over and dipped into pans containing the contact insecticide, or the leaves may be picked and destroyed.

The Codling Moth.—The codling moth is the insect that feeds on the seeds and around the core of apples, pears and quinces. In its destructive stage, it is a pinkish white larva, which comes from an egg laid on the fruit or leaf by a small winged moth, which flies by night and is properly called the codling moth. This egg is laid about the time the trees are in bloom, and shortly after the flowers fall the little larva or worm hatches from the egg and generally crawls to the blossom end of the fruit, where it usually makes its entrance. There is no remedy for it after it has entered the fruit, but if a spray of arsenical poison be used at the right time, it will be killed with

it when it takes the poison in attempting to gnaw through the surface of the fruit to reach the interior.

The best remedy is arsenate of lead, two or three pounds in fifty gallons of water, and the next best is Paris green, one-third pound in fifty gallons. Instead of using the poison in water alone, it is yet better to make the Bordeau Mixture by the use of four pounds of bluestone and six pounds of lime in a fifty-gallon tank or barrel of water, and add the poison to this. For pears, apples and quinces this formula is all right, but for peaches and plums it should be reduced by using one-half of the materials in the full amount of water.

To prevent the further appearance of the codling moth, fallen fruits should be destroyed as soon as they drop, either by gathering them or by keeping pigs or sheep beneath the trees. Also, bands may be put around the trees in midsummer to catch the larvæ which may there spin their cocoons and transform into their winged stage. However, if the bands be not examined at least once per week to kill the insects that collect beneath them, they are worse than though nothing had been used, for the reason that they will furnish hiding places for these pests rather than force them to transform where woodpeckers and other natural enemies would be liable to find and destroy them.

The spraying for the codling moth should be done just after the petals or flowers fall, and again in a week or ten days from that date. There are two broods of the codling moth per year, but if the spraying be thoroughly and properly done for the first brood, it will not be necessary to spray in July or August for the second brood.

The Bud Moth.—This is the insect which does its destruction when in the larval or worm stage, by eating the interior of the buds of apple and other trees. The chief destruction is done in spring and may be quite serious, because the undeveloped leaves are then so small that one bite may cause deformity of an entire leaf as it further develops. For the bud moth, spray with arsenate of lead or Paris green as soon as the buds burst and the green leaves are showing, and repeat just before the blossoms open. Carefully avoid spraying blossoms when in bloom.

The Apple Leaf Miner.—This comparatively new destructive insect makes a mine or tunnel in the green tissue of the leaves between the two layers or coverings, and as several may occur within one leaf they have a destructive effect and result similar to that of the frog-eye. The mines or tunnels made by this insect can easily be recognized by the fact that they are trumpet-shaped or worm-like in appearance. The larva which makes them transforms into a pupa and in the spring develops into a very minute moth which lays the egg on the leaf, and the larva hatches from this. Where this pest occurs, the leaves should be gathered and burned as completely as possible. A spraying of arsenate of lead and Bordeaux Mixture kept on the leaves during the spring and the early summer destroys the young larvæ at the time they hatch from the egg and before they are concealed within the leaf, is the only practical remedy that can be offered at this time, besides the destruction of infested foliage or fallen leaves. It is urgently requested that persons should also watch for this insect and send reports and samples of infested leaves to our office. Special attention must be given to this pest in this State before it spreads further.

The Scurfy Scale.—This is one of the older scale insects on fruit

and shade trees, given its common name from the fact that it resembles a flake of scurf or dandruff, such as is sometimes seen in the hair. The female is gray and fan-shaped and about the size of the letter "v" used in this type. The male is quite small and narrow, being no larger than the body of the letter "i" in this print. Beneath the scale of the female is to be found the purple eggs during the winter time and about midsummer. There are two broods per year, the first hatching about the third week of May and the second hatching during the early part of October. The life history, effects and remedies are practically the same as for the oyster-shell scale. Spraying when the trees are dormant with such insecticides as are recommended for the San José Scale or spraying just after the eggs hatch with mild contact insecticides, such as are recommended for aphids or plant lice, is advised.

The Tent Caterpillar.—As common and conspicuous as this pest is it is often confused with other species of caterpillars or larvæ of moths. This name is given only to those hairy caterpillars which hatch from a band of eggs encircling the twigs of cherry, peach, wild cherry and a few other trees, and form tents of thick white sheets of webbing in the forks of the branches on the trees, during the months of May and June. The tents may remain in a more or less dilapidated condition during all the year, but the worms or caterpillars do not remain in them after the latter part of June. This term should not be given to the web worms, which construct loose web coverings over the leaves of various fruit and forest trees, later in the year, nor should it be given to the caterpillars that denude walnut trees and form bunches of cast skins on the trunks. Ten caterpillars are to be killed by clipping off the egg masses during the winter and spring, and by spraying with arsenical poisons as soon as they appear and commence to form their tents in the spring and by removing their tents with a brush on the end of a pole or by shooting them out of a tree with a shot-gun loaded with only powder and paper. If a torch be used for burning them out, it can be made effective, but is liable to injure the tree, unless one be careful to have it near the branches only a very few minutes.

Wooly Aphis.—This is a dark blue plant louse, which secretes a white waxy or wooly substance over its body that protects it from cold, heat and water, and also from its enemies. The white covering and the number of these insects together form what resembles a small tuft of wool, and the common name is derived from this fact. They may live on the roots of trees or on the trunk, branches or leaves. Where there are injured spots the wooly aphis is especially liable to be found and by its continuous injection of a poisonous saliva and the sucking of the sap of the tree at such place, it causes a permanent injury and often results in the formation of knots or galls. When it occurs on the roots of trees the best remedy is to uncover the infested roots and put immediately over them a liberal sprinkling of finely ground tobacco leaves or tobacco dust and replace the soil. The woolly aphis above ground can be killed by painting or spraying the spots which it infests with strong soap solutions, oil emulsions, strong tobacco decoction or any other contact insecticide.

CHERRY.

Cherry Aphis.—The cherry aphis is a plant louse, but instead of

being green in color, as are those which have been previously discussed, it is of a dark brown color. The brown aphis is also sometimes found on peach. The plant lice of this color are more hard yor less easily killed than are the green aphids or plant lice. I have several individual records of their having been destroyed and the trees cleaned nicely by the use of the boiled lime-sulphur wash applied in the spring while the buds were swelling. We recommend this for cherry and peach each year, whether the San José Scale be present or not. Also a strong solution of whale oil soap, one pound in five gallons of water, strong tobacco decoction or kerosene emulsion supplied as a spray, will kill them.

Curculio.—The cherry curculio is the insect which makes wormy cherries and causes untold annoyance to the housewife, and in fact considerable loss to the crop. This is the pest the work of which is too well known to need description. The damage is done in the larval or grub stage from which it enters the ground, transforms to the pupa and remains over winter to come out in the spring in the form of a small curculio or snout beetle. To prevent this the trees should be sprayed with arsenate of lead and Bordeau Mixture, using two or three pounds of arsenate of lead in fifty gallons of Bordeaux just after the buds burst but before the blossoms open and again with the same liquid soon after the petals or flowers fall, and this spray should be repeated again in a week or ten days. The curculio can be caught by jarring the trees over sheets of cloth spread or held beneath them. It is advisable to cultivate the ground about the middle of July under infested trees and permit fowls to run in the orchard or yard where cherries and plums grow. Pick off the fruit that indicates that it is stung or infested and feed to the poultry or pigs and have fowls ready to destroy the fruit which falls early because infested.

The Leaf Slug.—The cherry leaf slug is one of the slug-like insects resembling a shellless snail, which lives on the leaf by devouring the epidermis, and causing the leaves to appear brown or scorched. It is a moist, dark, almost shapeless mass and is one of the most easily destroyed insects that infest the foliage of fruit trees. Similar slugs destroy the leaves of plum and pear trees and are to be killed by dusting with freshly slaked lime, and one part of Paris green should be added to twenty parts of lime, or by spraying with any of the arsenical poisons or dusting with hellebore. Any of the spray liquids for killing leaf-eating insects, such as caterpillars, will destroy these slugs, and because their bodies are slimy and moist they are killed by the lime dust the same as are the asparagus beetles.

THE BEETLES, OR COLEOPTERA.

Belonging to the "hard-shelled" insects, or Coleoptera, generally known by their common name of Beetles, are many species, which in both the adult and larval stages attack vegetation either above or beneath the surface of the ground. These insects have four distinct stages in their life history, recognized at once as the egg, the grub or larva, the pupa, and the imago or adult.

Among the insects which are very destructive, both in the larval or grub stage, and in the adult or beetle stage, is the one commonly known as the May Beetle, May Bug, June Bug, Dor Beetle, Drone Beetle, and other common names in the adult or winged stage, and familiar as the White Grub or "Grub Worm" in the larval stage. There is at

most, but one brood of this insect per year, the adult appearing in May and June, sometimes flying around lights at nights, in great numbers, and feeding at night upon the leaves of trees. They eat or cut away a great amount of the foliage. The eggs are laid in the ground, generally at the roots of grasses or other kinds of vegetation, and the larvæ there feed and grow. Their growth and transformation are slow, some species requiring two or three years for the completion of life in the larval stage. They then pupate or transform to chrysalids in cells in the earth, in which they pass the winter and come forth as the familiar large round June Bugs or May Beetles belonging to the spring time.

These insects remain and feed in the ground to such an extent as sometimes to eat the roots of the grass entirely away, turning it brown and making it possible to roll it back like the fleece of sheep. Where they are present in lawns we have used Carbon Bisulfide against them with success. Make a hole at a depth of about a foot, using some pointed instrument like a stick, and pour at least one-fourth teaspoonful of Carbon Bisulfide into each hole, making about three of them to each square yard of ground to be treated. Tramp the holes tightly after pouring the liquid in and thus prevent its too rapid evaporation. Where the pests are common in the soil in greenhouses and even in gardens they are to be killed by poison bait, such as poison bran mash, the same as cutworms. It is particularly important in orchards to keep the ground clean of weeds and grasses as these pests can be suppressed without difficulty by clean cultivation, which is likewise best for trees.

* * * The Flower Beetles, or "Fig-eaters," are insects which in their larval stage are grubs feeding upon organic material, such as manure, or sometimes the roots of plants, and in their mature stage they are liable to attack leaves and fruits, injuring them severely. There is also not more than one generation or brood of these per year. The life history is similar to that of the June Bug or May Beetle, and the remedies are practically the same. For both pests it becomes important to avoid placing fresh stable cleanings in hills where plants are to grow. Use either well rotted manure or plow the fresh cleanings down well beneath the surface of the soil.

* * * More visible damage is done to rose bushes by the Rose Beetle and more inquiries are asked concerning its destruction than any other coleopterous insect found in this State. This may be because of the wide range of food plants for this pest, and also because there is no good remedy for its immediate suppression, and it often feeds unchecked for some time. As we commonly see it, this insect is only in the adult or fourth stage. The life history should be understood, and is as follows: "It passes its early stages in grass on meadow land, especially if sandy—the larvæ feeding on the roots of grasses a few inches below the surface of the ground like the white grub, which they closely resemble except in size. The eggs are laid in the ground in June and July and the larvæ become full grown by autumn and transform to pupæ the following spring, from two to four weeks prior to the emergency of the beetles." (Year Book of the Department of Agriculture for 1895.)

This familiar insect is commonly known as the Rose Chafer, Rose Bug, Rose Beetle, and Cherry Bug. It attacks not only roses, but

fruit trees and fruits of many kinds, especially cherries and grapes. It eats irregular ragged holes in the leaves, and eats the young grapes from the bunches or stems on which they grow. It is familiar as a common and destructive pest.

The remedies for it are not always successful, and no simple and satisfactory remedy is known. It is generally not killed by spraying with arsenites for the reason that it takes nearly two days to kill it by poisons. They poison so slowly that the beetles which have eaten the poison may die and disappear only after recruits have appeared, and thus the operator will be led to think that the spraying has not been sufficiently efficient against them. It is recommended to spray them with a wash made by diluting one gallon of Crude Carbolic Acid with one hundred gallons of water. Fairly strong soap solutions and kerosene emulsion will also kill them. One of the best means of treating this pest is to shake it over cloths well soaked with kerosene oil and spread beneath the infested plants to cause the insects to come in contact with oil. If an insect once falls on an oil-soaked blanket it will be killed, even though not entirely covered with oil. Picking by hand is also recommended, and where the infested plants are but few in numbers it is advisable to pick or shake the beetles from the plants into pans of water carrying oil floating on the surface. Where other means fail it is advisable to resort to bagging grapes, or placing paper bags over them, to protect them, and also protect plants with netting. As those insects prefer leaves of spirea and white rose it may be found advisable to plant some of these near the grape vines to entice the insects to them, when arrangements could be made for spraying the infested bait plants or otherwise destroying the pests on them, and thus preventing the injury to the grape, cherry and other fruits.

As the larvæ feed on the roots of grasses, bushes, and other vegetation, it is particularly important in subduing the Rose Chafer that the sandy grounds where they are abundant be cultivated so that the pests will be destroyed in their larval stage and will not come to maturity.

* * * Among the leaf-eating insects that are very troublesome and injurious to vegetation are the Flea Beetles. One of these known as the "Steely Bug" attacks the grape vine to such an extent as now properly to be called the Grape Vine Flea Beetle. As the larva feeds on the roots of the plant which it attacks it is also called the Grape Root Worm. It is one of the most serious pests of the grape. The egg is laid in the summer at the roots of the grape and the larva hatches and feeds on the roots during the summer, pupating in the ground, spending the winter in this condition and place, and appearing in the early spring as the adult, leaping and flying beetle, which at once attacks leaves, making many small rounded holes in them. In its mature stage it attacks the grape leaves, and in its larval stage it is injurious to the roots. Spraying with arsenate of lead as soon as the adult beetles appear in the spring is one of the best measures, and frequent cultivation of the soil near the roots of grapes during spring and fall is to be recommended.

Flea Beetles on potatoes and other crops are often to be seen jumping readily, like fleas, and hence given their common name. Of course, they are not fleas, but true beetles, with chewing mouth parts,

with which they gnaw small holes in the leaves. The Potato Flea Beetle may be so abundant on the vines as to cause the leaves to turn brown from their effects. They can be prevented by spraying with the Bordeaux Mixture, with arsenate of lead or Paris green added. Use the same formula as for spraying for the codling moth, as given in our May Bulletin.

* * * Among the borers of our trees is a group known as Long-horn Borers. These are so named because their antennæ or feelers are of unusual length. The Long-horn Borers in their adult stage are beetles of rather elongate slender body and a pair of immensely long antennæ, like threads, on the head. In the larval stage they are familiar to fruit growers as borers beneath the bark and also in the wood of apple, pear and quince trees. The common name is given because the front portion of the larva is rounded and not flattened.

The evidences of borers are to be seen in discolored flattened spots of the bark, under which are the burrows, or by very fine holes made by the larvæ where they enter, or by fine grains of sawdust made by the mature or full grown larva when it bores to the outer side of the bark to make a hole through which it can push as a mature beetle after it completes its transformation. After making such a hole it withdraws into its tunnel and forms its chrysalis. In this stage it remains during the winter, coming forth in the spring as a mature insect.

Wherever borers are found they should either be cut out, or pierced by sharpened soft wires stuck into their holes, or, better, destroyed by injecting a fluid known as carbon bisulfide into their holes, using a spring bottom oil can to give the injecting force. Plug the holes with putty or mud and let them remain.

Get the borers out of the trees by cutting, piercing, or injecting, and then keep them out by painting the trunks of the trees not later than the middle of June each year with pure white lead and raw linseed oil, or with boiled lime-sulphur solution, or with the commercial preparation known as Tree-Borer Paint, which is really a commercial lime-sulphur wash with adhesive qualities, which sticks like paint. Two coatings of this material during the summer, applied about the middle of June and the middle of August, should be sufficient to keep the borers out of the trees. We have tried white lead and linseed oil on our own peach as well as apple trees, and have found no evidence of injury to any of the trees from painting with it. We recommend prevention of tree borers as being far more important than any remedy after they have entered.

* * * The Flat-headed Apple-tree Borer is also a serious pest of apple, pear and quince. It is not the larva of a Long-horn Beetle, but belongs to the Buprestids or Metallic Beetles, so called because the wings have a very decided metallic lustre when seen in a certain light. The life history of the Flat-headed Borer is similar to that of the Round-headed, the egg being laid on the bark about mid-summer by the adult beetles, the little larva boring through the bark and feeding beneath it and reaching its maturity in its cell or tunnel from which it cuts a hole while yet a larva, and makes its exit after it becomes mature. It then transforms into a pupa and remains quiet during the winter to come forth as an adult beetle in the spring time.

The remedies are exactly the same as for the Round-headed Borers, and the preventatives are also identical. It would pay well to paint the trunks of apple, pear and quince trees for borers, mice and rabbits.

* * * There are certain twig borers which are at times to be found boring in the twigs of fruit trees. Oftentimes the hole is to be seen going downward from the axil of a leaf stem or fork of a small twig. This hole has been made by a wood-boring beetle or its larva, and examination should at once be made for the pest. Where the twig looks yellow or wilts or shows signs of dying it should be cut off and split open, and if a borer be found present, it should be destroyed. By watching carefully the evidences of the presence of such insects, they can be found and their accumulation in such numbers as to become a plague can be avoided without much trouble.

The Twig Girdler is a beetle which cuts off the twigs for the nourishment of the young which come from eggs laid in the twigs. This beetle is to be destroyed by gathering and burning the twigs in September. As a rule it is not very abundant, but it may sometimes appear in destructive numbers.

* * * The Bark Beetles or Shot Hole Borers are among the most conspicuous pests of this State and are often thought to be among the most destructive, but as a matter of fact they are not so injurious as is supposed, for the reason that they attack only trees that are dying and thus merely hasten their death. When a tree has recently died it can often be seen full of holes, looking as though it had been shot into by a shot gun carrying fine shot. This is why they are called "Shot Hole Borers." There is no remedy for them, and the best step on finding evidence of the Shot Hole Borer in a branch is to cut it off and burn it at once. They may often attack large branches or one particular branch in a tree without attacking the rest of the tree. If they be not destroyed they are liable to spread to other trees and aid in their rapid decline. They should be killed by promptly cutting and burning all infested trees.

* * * The last group of beetles to be mentioned at this time are the Curculios or Snout Beetles, which injure leaves in the early spring by eating small holes in them while they are yet very small and quite undeveloped, and consequently making decided and conspicuous injury, but particularly effect much damage by puncturing the fruits of our cultivated trees, especially plum and cherry, and laying therein eggs from which hatch larvæ that become "worms" of wormy fruit of such varieties. The life history of the curculio of peach, plum and cherry is as follows: A hole is made in the fruit within a few weeks from the time the blossoms fall, and a small white egg is placed therein by the Snout Beetle or Curculio. From this egg hatches a larva which feeds within the fruit until it reaches maturity, and either drops with the fallen fruit or otherwise falls to the ground, just beneath the surface of which it pupates or becomes a chrysalis, there remaining during the winter to appear again in the early spring as an adult or mature insect.

The credentials of G. W. Settlemyer, as a representative of the "Inter-State Fair Association," of Johnstown, Pa., were presented by the Secretary and he was, on motion, accorded the privileges of the floor.

Adjourned.

WEDNESDAY, JANUARY 15.—9 A. M.

Mr. Eldon in the Chair.

THE CHAIRMAN.—It is expected to re-exhibit some of the fruit on exhibit here, and the exhibitors hope it will not be disturbed until they have had a chance to make their selections. I would suggest that before the close of the meeting the exhibitors take care of their fruit personally. It was suggested yesterday that all the fruit that is not taken away should be donated to certain charitable institutions in this city, but there are certain varieties exhibited here which cannot at this season be replaced, and which the exhibitors wish to exhibit elsewhere.

The first thing on the program this morning is unfinished business. If the Committee on Nominations is ready to report, this would be the time.

MR. HERR.—The Committee on Nominations would suggest the following officers:

For President, Gabriel Hiester; for Vice Presidents, Hon. W. T. Creasy, Mr. F. H. Fassett and R. M. Elden; for Recording Secretary, Enos B. Engle; for Corresponding Secretary, William P. Brinton; for Treasurer, Edwin W. Thomas.

MR. GOOD.—I move this report be accepted, and that the Secretary of this Association be instructed to cast the vote for the Society.

This motion was seconded and the aforenamed persons were declared duly elected.

MR. THOMAS, Treasurer, submitted the following report, which was accepted and referred to an auditing committee, who reported same correct and satisfactory:

TREASURERS' REPORT.

Edwin W. Thomas, Treasurer, to The State Horticultural Association of Pennsylvania, Dr.:

Receipts.

Cash balance January 17, 1907,	$112 52	
Annual dues for 1907 collected at Harirsburg,	73 00	
H. C. Cummings, life membership,	10 00	
J. King McLanahan, life membership,	10 00	
Annual dues for 1907, received since Harrisburg meeting,	20 00	
Annual dues for 1908, received in advance,	4 00	
Donation,	154 50	
Additional donation, June 3, 1907,	100 00	
Total receipts,		$484 02

Credit by amounts paid:

To Chestnut Street Market Company, Harrisburg, Pa.,	$25 00
To Prof. Geo. C. Butz, traveling expenses,	5 38
To Prof. G. F. Warren,	14 13

To Charles Duffy, hotel bill, Lochiel,	14 00
To Prof. R. L. Watts,	32 49
To J. H. Hale,	46 70
To Robert M. Eldon,	7 82
To D. M. Wertz,	5 56
To Enos B. Engle, Secretary, salary and expenses,	83 69
To A. W. Fulton,	18 75
To H. C. Cummings, stenographic report,	50 00
To Enos B. Engle, printing, etc.,	85 40
Baalnce, cash on hand,	95 10
	$484 02

We, the undersigned auditors, have examined the above account and have found satisfactory vouchers for money expended.

JOHN G. ENGLE,
JOHN G. REIST,
EDWIN C. TYSON.

THE CHAIRMAN.—If there is no further business, we will now proceed with the program. The first number this mornning is an address, by Prof. Stewart, of State College.

SOME PHASES OF PENNSYLVANIA FRUIT GROWING.

BY PROF. J. P. STEWART, Department of Experimental Horticulture, State College, Pa.

There are two main divisions to fruit growing—the business phase and production. Nobody will undertake the latter without some assurances concerning the value of the former. Hence we first consider it.

The August number of the *Western Fruit Grower* states that "the 1907 crop will bring about $2,000,000 to the apple growers of Washington county, Ark." Fifteen or twenty years ago, under a system of general farming in that county, the average yield in corn was fifteen bushels per acre, and the average price of land was fifteen dollars. Realizing the barrenneess of this style of farming, people began to plant trees. Part of the result is indicated above. The price of land in that county now, set in orchard, is $100 per acre up. Orcharding increased the value of the land nearly sevenfold, besides paying an excellent profit to the holder.

Twelve years ago, in Perry county, Pa., along the foothills of the Blue Ridge, the President of our State Horticultural Association bought an abandoned farm of 100 acres for $875. This fall, from four acres of 11-year-old Baldwin trees he sold $620 worth of apples. Note that one acre, costing $8.75, 12 years ago, brings $155 this year—a return of seventeeen-fold on its cost,—and he still has the acre! The farm is paying strong interest today on $10,000, and its producing power is only beginning.

Eight years ago in Franklin county, on the east side of the Cumberland Valley, a grower bought a farm for $50 per acre. He planted it in apples with peaches as a filler. In the last four years, from about 100 acres of bearing trees, he has sold $98,478 worth of peaches,—

a return of nearly $1,000 per acre in seven years from planting, with an apple orchard coming in on the same ground. One block of sixteen and one-half acres of Salway peach in this orchard has returned $30,111 since planting in 1900. Yet land like this in the same neighborhood, now in general farming, can be bought for $40 to $60 per acre.

Nine years ago, near Youngstown, N. Y., an unproductive 20-acre orchard of Baldwin changed hands. Proper orchard management was installed and the *net returns* from that orchard in the nine years has been $27,062. This, inspite of the entrance of the San José Scale, with its additional requirements of power sprayers and extra spraying.

These instances are not accidents. They represent returns from *large acreages* extending *over a term of years* and are not the chance returns of a few trees for a short period. They call attention to the business value of good fruit-growing. They show that it is easy to waste energy and capital trying to make a region produce something for which it is not adapted, and that it pays to seek out and do the adapted things. They illustrate clearly the profits that may arise from basing an industry on one of the most striking natural adaptations of this State—the adaptation to tree growth. They show that many farms in our State, useless or of indifferent success in general farming, can be made remarkably profitable in the production of fruit.

But these are not the only indications of the fact that fruit-growing in Pennsylvania is a good business proposition. In 1899, the last year upon which we have definite figures, Pennsylvania was the third State in the Union in the total value of fruit. In apples, the leading fruit of America, Pennsylvania ranked second with over 24,000,000 bushels, nearly all of which came from home orchards. And although the State was excelled by New York in total yield, *yet in average yield* of apples, *Pennsylvania excelled the latter by nearly one-half bushel per tree.* Pennsylvania has been called the "home of the sweet cherry," so as we should expect, in the production of cherries, this State ranked first, with nearly 475,000 bushels. In grapes, pears and raspberries it was fourth; in currants, seventh; in blackberries, eleventh; in plums, prunes and strawberries, thirteenth, and in peaches, sixteenth. These positions are all the more striking when it is realized that by far the major portion of this fruit was grown in home orchards receiving only "home orchard care," with the consequent reduction in value which, we know too well, accompanies such care. If these results can be obtained under such conditions, what may be expected from properly located commercial orchards handled in a business-like way?

But some one inquires, "is not the occupation too exacting, does it make good return per unit of labor, and are not the returns slow in coming in? We answer that it is exacting; that in good fruit growing certain things must be done, and done at the right times; that the only safe motto is the one followed by the pests and bugs, which is "be ready;" an dthat it requires wider information, a greater keenness of observation, and more ability to adapt action to immediate conditions than almost any other calling. Hence, the occupation should not be chosen by any one "who is afraid he won't like it." But for the man possessing the above qualities, who is not afraid of a contest, and is not easily shaken from his purpose, it is an occupation that has few rivals either in financial returns, or what is of greater im-

portance,—in promoting the development of the individual. There *are* no keener nor better men than some I have met among Pennsylvania fruit growers. There are few better solutions to the problem of keeping the boys on the farm than to get them interested in the production of fruit. To know a fruit farm, in all its details of soils, and varieties and inhabitants and to be able to manipulate them is a liberal education.

As to the returns-per-unit-of-labor, we may say that in Erie county, the grape business regularly returns from $50 to $150 per acre with an outlay that we are informed is scarcely greater than that involved in raising an acre of corn. In the same county last year gooseberries are reliably reported to have produced no less than $900 per acre. Near North East one and one-eighth acres of twelve-year-old so-called "York State" prunes,—probably a strain of the Italian or Fellemberg,—the last two years produced the unusual sum of $1,688 with almost equal returns reported from Bradshaw plums. In Berks county, during the same time, five acres of peaches produced $1,100 per acre. These are *only a few* of the results that we have gathered in a very general fruit-survey of the State. They indicate the wide range of territory and varieties that are profitable here. While we have no data to show what the outlay was in producing them, yet they should effectually set at rest any fears as to the size of "return per unit of labor." There is no question about it, with the man and the other factors right, fruit growing offers as liberal returns, in proportion to labor and capital involved as any occupation upon which we have seen figures. Just there is our problem, to get the factors right and keep them right.

The third question, as to the returns being slow, will be discussed later. We may say here, in passing, that this difficulty can be much lightened by a proper system of intercropping and by the use of fillers adapted to the section. This is a difficulty that must be reckoned with, however, by men of small means, to avoid the danger of over-reaching, with the consequent danger of neglecting sacrificing his orchard. But it is clear that for such returns as those recorded above it will pay to wait.

Most of what has gone before is on the business phase of fruit growing. There are few things more to be noted in this connection, before taking up the producing side.

First, this State is just starting into commercial orcharding. In the decade covered by the last census, Pennsylvania planted 2,676,000 trees, as compared with 626,000 planted by New York. This planting is still actively going on in certain parts of the State. These orchards are coming into bearing, and there are many problems that the owners are facing. Chief among these, in connection with the apple, is *storage*. Apples have two important advantages over most other fruits. If the market is unfavorable at picking time, they can be readily held until it improves. And the fruit has so many uses, and can be shipped so widely, that the market seems able to handle an almost unlimited supply during the entire year, hence prices are practically sure to rise during the storage season. This is especially true in large crop years, when prices are low at picking time. We can illustrate this by the experience of two men in Southern Pennsylvania last year. One of them had 900 barrels of Gano, which he admits were as fine looking as any apples he ever saw. For these he

obtained ninety cents per barrel in the orchard, which was considered a good price at that time. Yet from April on, those same apples were sold regularly on the Philadelphia market for $4 to $6 per barrel. Another grower, in Bedford county, with the lamented Ben Davis stored his apples in a three-hundred-dollar "cold air" storage house holding about 600 barrels, and in March sold them for $2.25 per barrel for the fruit, for which he was offered only fifty cents in the fall.

The fruit grower does not feel that he is against the storage question yet, and we admit that he is not facing it by any means so strongly as he will in the near future. But he was against it last fall. The Illinois Station has shown that a very satisfactory ice storage house of 2,000 barrels capacity can be built for $3,500 ($3,430.40). This building, in Southern Illinois, is reported to have kept apples during the seven months' storage season at a temperature of 33 degrees or slightly lower, at a cost of 19.1 cents per barrel, including 10 cents interest charges per barrel. This represents an annual saving of $618 on 2,000 barrels over ordinary city storage charges. It also often saves unnecessary freight and cartage charges. And this house could have been put up last year by the grower with the 900 barrels of Gano had he sold that at this spring's prices instead of last fall's. This is not presented in any sense as a criticism of the grower, but to illustrate the fact that in this comparatively new business, growers are often confronting problems of which they are not aware, and to show that it is poor economy to delay adding an equipment that is really needed.

Then there is the question of marketing. We often receive complaints "that fruit wastes when there is a crop," "No buyers and prices so low that it won't pay to handle it." If the fruit has been properly grown and is really good, there is absolutely no excuse for such results, especially in such a year and State as this. To sell apples regularly and profitably, three things are required. First, the fruit should be really good, of proper size and color, and free from blemishes by codling moth, scale or fungi. These *can* be prevented by efficient spraying, and by that only, as I have reason to know. I have seen an orchard this fall so free from codling moth that, in spite of a heavy crop of fruit, I was unable, after considerable search on trees and among wind-falls, to find a single apple that had been injured by that insect. We did find some injury by the lesser apple apple worm (*Enarmonia prunivora*) but no codling. Of course, there was codling injury there, but it was so scarce that one had to hunt for it and hunt long. These apples would sell on any market. Proper spraying is good business policy.

The second requite for profitable selling is that the fruit be properly packed. I have seen car loads of apples this fall, selling at forty cents per hundred, loose and mixed, when similar fruit in other localities properly barreled, sorted and graded was bringing $3.00 per barrel. After allowing for the extra cost, this was an increase of over 400 per cent. for the trouble of packing the fruit right. That is an extreme case, but it shows how little attention is being paid to some of the simplest business principles, and indicates why some people fail in fruit growing.

The third requisite is to let the location of good fruit be known; in other words, when necessary, advertise. Ink is cheap, and its use is understood in most other vocations better than in the fruit business.

This advertising need not be done in the papers. An efficient method of disposing of fruit of all kinds, in moderate quantities, which is in excess of the demands of local markets, is in operation by a grower in Erie county. He gets Dun or Bradstreet's Business Guide and makes a list of all reliable fruit dealers or grocers within convenient express distance from his station. He then takes his hand press and sets up a form in type telling just what fruit he will have for sale during the next two or three days, and sets a price. This is run off on special, souvenir post cards with colored pictures of the general kinds of fruit offered—cards being obtained from the Stecher Lithographic Co., Rochester. The result is that his fruit all moves off promptly direct to the retailers and all at remunerative prices, inasmuch as he sets them himself. In this way his apples were sold this fall at $4 per barrel, when ruling prices from buyers were only $3. This system has the advantage of directness. The fruit goes straight from grower to retailer, and in the absence of fruit marketing associations, is one of the most efficient methods of market yet seen.

Turning now to the *producing side of fruit growing,* the first problem the prospective orchardist strikes is *the soil.* What kind of soil should he choose for apples, and will the same soil do for all kinds? This is a most important problem, and one that we wish we knew more about. It is being especially studied now by Mr. Wilder, of the Federal Bureau of Soils. The soil expert can often tell in advance whether a soil will produce apples or not. But from the grower's standpoint, local experience with soils is of great importance in solving the problem. Oak and chestnut soil is generally considered good, but in general it appears that for many varieties a moderately heavy soil, that is one with a silty-loam surface, underlaid wilh a deep and somewhat heavier sub-soil is best. This sub-soil may be a plastic, clay loam; not of the stiff, hard type, but plastic, friable and moist, though well-drained. Upon such a soil as this the York Imperial, Rhode Island Greening and Grimes do their best, so far as our present knowledge indicates. Some varieties, however, require a much lighter and sandier type of soil. This is true of the Jonathan, Baldwin and probably to a less extent of the King. These varieties will not do well on the heavier soils, and the heavier soil-varieties will be less successful on the lighter. Much of our condemnation of certain varieties as being too far south or of insufficient elevation has probably been due to considerable part to their location on wrong soil types.

A striking case of *different soil requirements* is observable in Franklin county on distinctly sandy loam, in the case of the Jonathan and York Imperial. The Jonathan is ordinarily regarded as a weak grower, "only attaining vigor with age," but on the sandy loam soils of Franklin county, thus far, it is distinctly excelling the York Imperial, both in growth and yield. The trees are growing side by side, are eight years old, and the Jonathan has borne three light crops to one crop about half as large from the Yorks. Eighty of the Jonathan trees this year bore 893½ pounds of fruit, while eighty Yorks bore 494 pounds. The average trunk girth of the eighty Jonathans this summer was 12.27 inches, while that of the Yorks was 11.24 inches. Thus, in eight years, on a distinctly sandy soil, the Jonathan has exceeded the York Imperial in growth by more than one inch per tree in trunk-girth, besides bearing several times as much fruit.

In Bedford county, on a heavier, more clayey soil, the difference

is practically as striking in favor of the York imperial. The trees are still young in both cases, so that we are unable to give final conclusions, but the figures indicate clearly that the York Imperial thrives best on one type of soil, while the Jonathan requires another. People in planting orchards should note the different soil requirements of their varieties, so far as known, and distribute them accordingly. It is only in that way that maximum returns can be economically produced. Much can be done, however, even on imperfectly adapted soils by good orchard management.

The next thing of importance to the prospective orchardist in Pennsylvania is the *mangement of the hillside orchard.* There are some advantages in the hillside orchard. It is not usually so costly. "Foothill" land is very abundant in the State. It often produces good apples, and is with difficulty rendered profitable in other lines. Drainage of frosty air and excess water is accomplished naturally and thoroughly. But it is open to the great disadvantage of the washing away of soil under tillage, and soil is usually not to be spared on the average Pennsylvania hillside.

In orchards already set, it is probable that the *sod-mulch system,* so successful in Ohio, is the best solution. This system has much to commend it for any orchard, if carried out in its completeness. It effectually prevents washing; the decay of the mulch furnishes a large source of food for tree growth and bacterial action; feeding roots are permitted to develop unmolested in the surface soil, and even to come up into the mulch in great abundance, which they do the first season where the mulch is deep and undisturbed. A three-ton-per-acre straw mulch applied June 19th to trees in Mr. Ledy's orchard in Franklin county, showed many rootlets in the mulch by the first of October.

But the mulch system is open to the objection that for large orchards sufficient straw for mulching is very difficult, if not impossible to get, and, when it can be obtained, is quite costly. This will keep it out of the majority of our level orchards. But for the hillside orchardist, with his trees already set, it is probably the very best system of management. It has proved so in Ohio, where it gave better results in both growth and yield than any other system, on ground that was gently sloping.

But if the *hillside orchard is not already set,* there is another method available which we believe affords the best solution to the problem of its management. This method is to set out the rows on contour lines,—lines of equal height or practically so—and then cultivate them the level way, using a cover crop from fall through early spring and leaving a strip of sod along the rows to prevent the formation of gullies. In addition, in those cases where conditions warrant it, the soil can be plowed with a reversible plow, always in one way, and thus build up a set of terraces. But wherever terracing is intended, it should be done before the trees are set or while they are in the early stages of root development. The contour system thus permits regular orchard cultivation and cover crops to furnish green manure and humus on hillside orchards of any reasonable slope, the same as on our best level orchards. The importance of this may be seen when it is remembered that in Warren's Survey of Orleans County, N. Y., the total number of tilled orchards during five years averaged 86 per cent. greater yield than those in grass. Essentially this "contour tillage" system is now in successful operation in Mr. Waite's

orchard in Maryland. There is no apparent reason why it should not be of distinct value in extending the range of tillage and cover crops, to the hillside soils with their own peculiar advantages. The combination should work beautifully. We wonder whether there is any good reason for the present custom of setting orchard trees in squares, triangles or hexagons, except possibly for looks, and we question whether in the management of the hillside soils, a well-kept contoured orchard is not to be preferred even for that.

The next matter of importance to the man developing an orchard is *how to make it pay its way, up to the bearing years.* This depends largely on the locality. Where soil and climate permit, probably the surest method is by planting peach, or possibly plum and prune *fillers.* There are some objections, however, to having stone fruits and apples mixed, one of which is the development of curculio. Apple fillers with varieties of early bearing habit, such as the Wagener, or fillers of dwarf apples on French Paradise stock have also been suggested to meet this need. But their value in this direction is not entirely demonstrated.

Probably the *best general methods of making a young orchard pay its way* are to be looked for in proper systems of intercropping. Where potatoes are successful, a very efficient system can be based on them. Where the acreage is large or labor scarce, a system in use in Adams county in Mr. Tyson's orchard is very good. It consists in cultivating the tree rows in gradually widening belts, and between these belts, potatoes followed by clover and timothy are grown, with the addition of heavy fertilizing. One year of potatoes followed by two years of hay rotated over three orchards is the plan. It has carried the orchards up to eight years of age and returned a fair annual profit.

There may be some questions as to one phase of this system, viz, the use of hay in the orchard. Timothy especially has been credited with exerting a harmful influence on tree-growth. Its place in the system may be justified, however, because of the large acreage. And the *harmful effects may be largely neutralized by the cultivated strip about the trees,* the liberal use of fertilizers, and the fact that the hay and sod diminish blight and check washing.

For smaller acreages we would modify the above plan as follows: Plant early varieties of potatoes and follow them with a cover crop of crimson clover or rye. In spring, as soon as necessary to plow for potatoes, turn under the cover crop, add necessary potato fertilizer and plant another crop of potatoes. Keep up method every year, unless trees get such a vigorous growth that fire blight strikes in, in which event it may be necessary to check growth by cropping in hay or grass.

Near good truck markets a vegetable intercropping system is best. One in use in Waite's orchard in Maryland is based on sweet potatoes, cantaloupes and tomatoes. Briefly, it is as follows: first year, orchard is set in corn, later being kept far enough away from trees to prevent injurious shading. Second year, it is heavily manured with 1,200 pounds commercial fertilzer plus ten tons of stable manure per acre and set to Big Stem Jersey sweet potatoes. Third year, orchard is intercropped with cantaloupes or tomatoes, or both, followed with crimson clover. It is worthy of note that the clover will not grow on his soil until after it has been trucked. Fourth year, crimson clover is turned down when about six inches high, followed by sweet potatoes

with fertilization, or corn is again planted and followed with crimson clover or cowpeas, after which the series is repeated. This method of intercropping is adapted to smaller averages than the one above, and is suitable for localities where trucking is profitable.

But the *most efficient trucking system of intercropping* that has come to our attention is one used to some extent in New Jersey. It consists in planting early garden peas in rows five feet apart, and using later vegetables, such as tomatoes, muskmelons, early and late cabbage and occasionally sweet corn and sweet potatoes between these rows. The crop of peas is harvested and the vines turned under in the cultivation of the other vegetables, to assist in feeding them. If the vegetables can be harvested in time, they are turned under and followed by crimson clover. If not, they are followed by rye. The cover crop is turned under in the spring in time to plant the peas. Before the peas, commercial fertilizer to the extent of 100 lbs. of muriate of potash, 500 lbs. acid phosphate, and 200 lbs. of tankage or its equivalent in nitrate of soda is applied and the same procedure is repeated, year after year. This method has been very successful in the trucking districts, enabling orchardists to buy farms, set them in trees and pay rapidly on them from the very start. They frequently obtain $50 per acre on an average from the peas alone, and where the necessary labor is obtainable near good truck markets, the system should prove very valuable here in Pennsylvania.

There are many other systems, but the *main principle in intercropping* is to use an early-season hoed crop that will more than pay for its own and the orchard's tillage without injuring the latter. This rules out the grasses and the cereals, except possibly corn, and everything else that cannot be tilled to some extent in the spring.

We also have some evidence that there are mutual likes and dislikes in the growth together of certain plants. Some plants seem not to be friends, neither when grown together nor when one immediately follows the other. This needs to be further studied, both with reference to cover crops and intercrops, and we have plans under way to accomplish something along this line. There is no more interesting or fertile field for investigations in horticulture than these relations between trees and crops, and the general question of how best to make the young orchard pay without reducing its final value.

There are several other problems in orcharding that we must pass over at this time. Among these are management of bearing orchards, fertilization, pruning and the selection of varieties.

In conclusion, we wish to consider a phase of orcharding that is of the most immediate importance to a great many people in Pennsylvania, viz, *the handling of the old or middle-aged unprofitable, home orchard.* Of course, it is impossible to say just how this should be done in any particular case without studying the causes that have made the orchard unprofitable. In many cases nothing can be done except plant a new orchard, taking advantage of experience gained and that of others in the locality. But there are also many cases where orchards are only thought to have passed beyond their period of usefulness and where a system of orchard renewal can be practiced with great profit. Many things said above bear on this question of making any orchard profitable, but some more specific treatment is demanded by the refractory cases.

We may illustrate this by an example. Five years ago, in Southern

Pennsylvania, a five-acre orchard of thirty-seven year-old York Imperials was considered so unprofitable that three and one-half acres were pulled out to use the ground for something better. It was concluded, however, that the last acre and a half should be left, and heroic measures taken to see whether it could be killed or cured. On the acre and a half, however, there were trees missing, so that actually but one and one-eighth acres of ground were covered by the fifty-four trees of bearing age. The grower's own description of methods and results are as follows:

"Our old orchard of fifty-four York Imperials about thirty-seven years old was severely pruned the fall and winter of 1903. During the winter the ground was heavily manured and the following spring was plowed as shallow as possible, followed by an application of ten to fifteen pounds of potash fertilzer, analyzing about 10 per cent. actual phosphoric acid and the same of potash K_2O sowed by hand in a circular band extending from a circle, say three feet from tree, to another circle well outside the line of drip from branches. This was followed by thorough stirring with spring-tooth harrow, which was repeated at intervals until about harvest time and then allowed to grow up, which it proceeded to do very rapidly, so much so in fact that we found it best to mow twice before picking time. This operation has been repeated every year since, the off year as well as the full year (including spraying for scale and codling moth). Our account with the orchard since 1903 is as follows:

1903	Before dehorning trees, gross returns for fruit, no expense except pick and pack ($35), ...	$240 00
1904	Total expense, $69.60, gross returns, ...	61 40
1905	Total expense, $194.56, gross returns, ...	699 51
1906	Total expense, $73.08, gross returns, ...	115 00
1907	Total expense, $188.70, gross returns, ...	884 00

The first grade fruit for the several years was as follows:

1903, ...	87 barrels.
1905, ...	258 barrels.
1907, ...	289 barrels.

Also for purpose of comparison, the net returns seem to be:

1903, ...	$205 00
1904, ...	8 20
1905, ...	504 95
1906, ...	41 92
1907, ...	695 30

Starting from the first full crop since trees recovered from heavy pruning, we find that total net returns are $1,242.17, or an annual average of $414.06. Counting the full crops only we have an average for the two years of $594.62 per year. Understand these are all net returns and are not guesses either, as we charged all labor at full price we paid for it, including thirty cents per hour for supervision."

These are actual results and methods on one specific thorough thorough case of orchard renewal. We have seen them proportionately successful elsewhere. Additional measures, including top-work-

ing, must be taken where the varieties are unsatisfactory in addition to being unproductive. It is desirable to start the renewal operations at the close of the full year in order that trees may accommodate themselves to the new order of things in the off year and be ready for increased bearing in the next full year.

A specific plan for doing this work of renewal on two Pennsylvania orchards has been prepared, but includes too much detail for rehearsal here.

MR. GOOD.—If I am allowed the question: I may have misunderstood you, and if so, I am willing to stand corrected. In your comparison between the cultivated orchard and the grass orchard, the figures showed in favor of the cultivated orchard. Now, were those grass orchards cared for, or were they neglected orchards? In our section the orchards are grass orchards, but they are neglected orchards.

PROF. STEWART.—These were orchards of five acres and over, and in that county they depend largely upon the returns from their orchards. Now, the grass orchard is likely to be neglected in other ways, so we cannot say that the difference is due simply to the grass, but the conclusions derived from the results in that county, and other counties, seem to warrant the assertion that the cultivaed orchard will produce the best results.

THE PRESIDENT.—Any other questions? We can devote a few minutes to the discussion of this topic. If there are any points Prof. Stewart has not named, now is the time to question.

MR. ROBERTS.—I am a little surprised to hear the Professor say he advises raising hay in the orchard. I believe in raising crops in the orchard, but hay is not good for an orchard. We consider it detrimental to the orchard in New Jersey. We have started in to develop orcharding in some of our localities. The farmer is something of a factor. He is there, and expects the State to see what he wants and help him raise this fruit. Now, there are very few good dry soils in Pennsylvania where orcharding would not do; I come from across the river, where we have the moist, sandy soil, and yet we raise fruit, and raise it very successfully. The man who has the sandy soil will succeed with that; the man who has the clay loam will succeed in that; the man who has the gravelly soil, and the man who has a good dry soil, will each manage to make the most of that. It all depends on the man more than on anything else.

DR. GUMP.—There has been a great deal said about the importance of a cover crop and proper tillage, but there is one important factor that is often overlooked, and that is this: In growing apples, if you grow a good article, you will have no trouble to dispose of it. Now, in order to make your cow give good milk, you must first give her plenty of good feed; the same thing holds true with the horse, and with the hog, and with everything else. So, if you want good fruit, you must first study the matters pertaining to the soil. Now, in our county in Southern Pennsylvania, we have different soils; we have

the heavy soil, and the limestone soil, and trees of almost any kind do very well, but on the higher land, with red shale soil, the orchards should be thoroughly cultivated until the trees are five, six or even eight or ten years old, and it depends entirely upon the different kinds of soil as to whether you take hay, oats, grain, or anything else from it. In setting out an orchard, you should study the time, and wait for the results. Twenty-five years ago I set out an orchard, and I waited ten years for a return of any commercial value. In that time I had my orchard thoroughly tilled, and raised cover crops, as has been stated. Now, when you begin to get good results, say in eight or ten years time, then you are ready to go into the market, but it means energy and hard work. The man who means to succeed must not lie in bed until eight or nine o'clock; he must be up and be at work. No matter in what capacity his work lies, it means the same thing. If you have started an orchard for market, if your fruit is fine, you will never have any trouble to sell it. If it is not fine, you can see where the fault lies and make it fine.

Then comes the marketing of your fruit, and here is another point that is overlooked to a large extent. Every man who has fruit to market should acquaint himself with the conditions of that market. There is not a commission man in the country that is not ready to take advantage of the man who has fruit to offer. Now, I have found that it is wise to go and find out just what the market has. In November, I went to Pittsburg and saw apples there from the Hood River district, at least they were so stenciled on the box, although I don't believe that they ever saw Hood River. I don't believe they were ever there. But these apples were selling at $2.50. On November 11th, Alexander was selling at $2.50, Wolf River at $2.50, Jonathan at $3.25 a bushel box, Rome Beauty at $3.00 and McIntosh at $3.00. Now, I was there last week and they were only worth $2.00. This is entirely due to the money stringency. I went around and saw the markets in Pittsburg; I have been doing that for fifteen years, and I never saw the inferior quality of fruit that I saw there this year. They are shipped from Maine down, and they are willing to sell them at almost any price, in order to get rid of them. I did not see first-class fruit anywhere, and I saw upwards of twenty commission houses. I was in Philadelphia yesterday, and saw upwards of twenty commission houses there, but I did not see a barrel of A No. 1 apples there. They keep them in cold storage, and then want five or six dollars a barrel for them. I tell you this simply to show you that if you raise first-class fruit, you can always sell it, and once it becomes known that you have first-class fruit, when a man comes to buy, he will always come to you. I talked with several men yesterday, and told them that we had from twenty to twenty-five carloads of fine fruit, and they asked me what we wanted for it; I said "come and look at it, and see if it is not worth more than anything you have on the market; if it is not, I will sell it to you at any price." The big thing in getting a market is to get the price, and if you have the article, you can get the price.

PROF. STEWART.—I was very much interested in the remarks of Mr. Roberts, concerning the raising of hay in the orchard. I am glad to bear him out. I think I said when I was going over that point that in the raising of hay in the orchard, the tree should be cultivated as far out as the roots extend.

MR. ROBERTS.—I did not hear it.

Several gentlemen in different parts of the room said simultaneously, "yes, he said so."

PROF. STEWART.—Now, I am just as much opposed to raising hay regularly in an orchard as any one can be. If a man raises hay or any other cereals in his orchards, he is apt to look to them for his profit, and to some extent neglect his orchard. I simply suggested hay as a sort of compromise. In this State it is difficult to get a man to change from the grass-pasture system, but I believe we can do it by using clover and timothy hay as a compromise. It has some advantages. It prevents erosion. Also, under certain circumstances, the tillage and cover crop system is attended by severe blight, and when an orchard gets blight the only comprehensive way to deal with it is to check succulent growth. Hay will do that very satisfactorily. And if a belt is cultivated on either side of the trees, when hay is the intercrop, and then rotate with potatoes every third year, the injury to the orchard should be slight.

This whole subject of suitable and unsuitable intercrops is in an unsettled condition, and we are planning some experiments calculated to find out just which intercrops are friends, and which of them are enemies of the trees. However, we already know of several intercrops that are of great practical success, and I should be pleased to have Mr. Roberts give us an account of the system that he and others are using so successfully iln New Jersey of intercropping with peas and vegetables.

THE PRESIDENT.—We can still spare a few minutes.

MR. ROBERTS.—We have very mellow land, and our plan is to first sow field peas, and market them; these furnish the ammonia and leave the field ready for other crops. With them we raise melons and cabbage, and we find a ready market for them, and they give good financial returns. In this way you will have your orchard paid for by the time it comes into bearing. Then we raise cover crops, like crimson clover after the vegetables are marketed. Last year I raised 250 acres of market peas. Now, our land is not as good as yours, but experiments at Washington go to show that the best land is not an essential factor. It depends on the treatment and the man. The best land will produce poor crops unless properly cared for. Of course, if you have land like this, it is all right, but we are over there and we expect to stay over there, and we must make the best of the land we have. Last year we had a great many peas, and the results averaged $50 per acre from them; sometimes the result will nearly double that, but the expense of raising peas is very small, and then we often raise field peas as the last crop and plow them under as a fertilizer.

A MEMBER.—How do you cultivate them?

MR. ROBERTS.—Oh, we get a hundred Italians and take care of them. We have no trouble with them. The man who wants twenty Italians is apt to have trouble to get them, but the man who wants a hundred can get all he wants; they like to travel in groups.

As a winter cover, we use sod mulch. We find it very economical, and we recommend its use.

THE PRESIDENT.—We are certainly very glad to hear the Jersey method.

MR. COOPER.—I would like to offer a word in reference to growing crops in the orchard. I have one orchard that is about forty years old, as near as I can remember, and I have learned in these years that there are various crops that can be grown to advantage in an orchard, and one of the most valuable is alfalfa. The Professor here has spoken of peas, but nothing has done our orchard so much good as the alfalfa.

I want to state what we did with reference to last year's preparation of the orchard. We have about two or two and a-half acres of alfalfa growing on the eastern side of the orchard by the hedge row, with plum trees on the west. Last spring that orchard was planted in crimson clover; then we plowed it under, and planted the alfalfa; then we had alfalfa on the east and west, and we find that not only have we the crops of alfalfa, but the trees themselves are very much improved by simply growing the alfalfa; it acts as a fertilizer. We do not pasture it, but we cut the first crop usualaly about the middle or last of June, and then we allow the second crop to grow as long as the fruit is on the trees, and our results have been so good that I would advise the use of alfalfa, cutting the first crop and letting it decay easily, and a second crop will follow, and a third crop, and a fourth crop. Our fourth crop grew until it was about twenty inches high, and then I left the chickens run over it, and they lived on it for about three months, so that I am thoroughly convinved that by using a crop of that kind it will pay you handsomely for your trouble and expense.

THE PRESIDENT.—We will be obliged to drop this subject now, and take up the next one, which is very close to it. We all agree that fruit can be grown on almost any farm in Pennsylvania; as Mr. Roberts says, it depends on the man; still the farmers are beginning to find out that it is the difference in soil that makes the different varieties of the fruit. We have present with us to-day a gentleman who has devoted a number of years to the study of the soils, especially to the study of soils as related to the development of fruit. Mr. Wilder, of the Department of Agriculture, at Washington, will now address us. I have the pleasure to present Mr. Wilder.

THE ORCHARD, ADAPTATION OF SOIL TO VARIETY.

PROF. HENRY J. WILDER, Bureau of Soils. Department of Agriculture, Washington, D. C.

Mr. Chairman, Ladies and Gentlemen:—I want to talk to you a few minutes about one of the factors in fruit growing which, very strangely, has received little attention until recently. In planting an apple orchard, the first subject for consideration is its situation with respect to drainage of both air and water, then exposure, and regional or climatic adaptation to variety. These factors may readily be determined by superficial observation, and very often are the only ones considered, as many think the character of the soil makes little or no

difference if the other conditions are right. But the fact is already well established that after these factors have been decided upon, the consideration of the kind of soil is of utmost importance, not only as to its general adaptation to orcharding in that it is "deep and well-drained"—often the only factors considered—but particularly with a view to planting each variety in the kind of soil where it will produce the most of the best variety of that particular variety of fruit, for there is no longer any doubt that certain varieties at least have a very decided preference for soils of certain characters and that such varieties should be planted commercially on those soils only, which produce them to the best advantage. For it needs little argument to show that a given variety grown upon a soil which contributes most ideally to its production will have little or no competition from the same variety grown upon a soil less suited to its requirements.

Now, in general orchard planting, the intelligent farmer has succeeded in avoiding such hilly localities as are underlain by flat rock formations of sandstone or shale. This refers particularly to the shale hills where the shale lies close to the surface. And he has also avoided low, flat and poorly-drained areas—that is, he has shunned the extreme soil conditions which were manifestly not adapted to fruit growing. But how is he going to avoid soils which judged by the same outward manifestations, should be good, whereas they are actually unsuited to orcharding? For the texture and structure of soils in their under strata is frequently such as to produce precisely the same or similar effect on the growth of the orchard and the quality of the fruit, as the thin or wet conditions already mentioned. So let us consider for a few moments the soil preferences of a few representative varieties and for this purpose I have chosen varieties to illustrate the general range of adaptation from the heavy to the light soils.

The first variety to be considered is the Rhode Island Greening, which you do not want to grow in this immediate vicinity, but in the northern part of the State, where the soil is different, it is a good variety; also, in New York and in New England. The Rhode Island Greening does best on a heavy, silty loam surface soil, with enough organic content to give it a dark brown color, but not enough to give it the black color of the Albemarle Pippin soil. The subsoil may range from a heavy silt loam to a silty clay loam, that is a subsoil rather heavy, but still plastic and workable, not stiff and intractable. A good moist, yet well drained, corn and grass soil that produces at least a moderate growth of corn, which retains a good green color until harvesting.

If we go farther south, in Pennsylvania and West Virginia, etc., this soil is also the ideal for the Grimes—an apple of high quality which has become very popular, and is being planted extensively in the region mentioned.

For the Northern Spy much the same kind of soil is desired, only it should be a little less moist, i. e., with just a little lower content of clay and silt—nor can it utilize quite as low positions as the Greening, and it needs more sunlight to bring its most desirable color and flavor. I might relate an occurrence which happened in Western New York a few days ago, when I made a statement similar to this about the Northern Spy. A man brought me a couple of Spies, and asked me what I thought of them. I said they were as fine on the exterior

as any I had ever seen, finely colored and well developed. He said: "I grew them on the soil that you said was not adapted to them." I said: "It looks as if I was mistaken then, doesn't it?" Now, we know that the flesh of this variety should be very tender and juicy, with crisp texture and high flavor. We cut one of those apples and found it very coarse-grained, the flavor was not good, and it lacked the tender, juicy quality, characteristic of the Northern Spy. This illustrated very forcibly, I thought, that the Northern Spy has a preference for certain soil conditions.

We will now go farther south and consider the Mammoth Black Twig, a variety adapted to the general region between Virginia and Arkansas. It is a good apple, of so much promise that extensive plantings have been made of it, and it would be very profitable if it would bear good crops, but often it has been so deficient in this respect that it has been a great disappointment to many. If planted on a rather thin soil, however, such as a shale loam, where the wood growth can be held in check, if necessary, and then allowed to develop only moderately it becomes productive and profitable. Hence the soil conditions for this variety must be such as to be held in control—making sure that wood growth is not too rapid.

MR. CARTER.—Is it a sandy or clay soil?

PROF. WILDER.—The shale loams usually have a surface of silty loam, mingled with variable amounts of shale fragments. The subsoil is similar except that there is a little more clay present. I would not put it on a sandy soil, unless the sand content is very fine. Are you acquainted with the Piedmont soil, in Virginia?

MR. CARTER.—No; I am not.

PROF. WILDER.—What particular county do you live in?

MR. CARTER.—Chester.

PROF. WILDER.—Well, through there I would not advise you to grow it, unless you can put it on thin hill soils. There are other varieties that can be grown there to better advantage on most of the soils.

MR. BRINTON.—Do you mean that the Mammoth Black Twig requires a light soil,—one that would not produce a very big crop of corn?

PROF. WILDER.—That is about the idea of it.

MR. BRINTON.—Are you acquainted with the Mammoth Black Twig growing near Indian Camp Creek, on George E. Murrill's plantation, in Virginia?

PROF. WILDER.—Yes; they were doing very nicely when I was there a few months ago.

MR. BRINTON.—I was there this fall myself, and I am quite sure

that that soil will not grow particularly large crops of corn or wheat, although I think it would grow wheat better than anything else.

MR. CARTER.—I would like to ask what we should plant in Chester county?

PROF. WILDER.—I will get to that in just a little, and if I don't answer it, please ask me again, because the next variety I am going to talk about is one that will do best in Chester county. The York Imperial is an apple well adapted to that region. I don't think we should plant it very far north of Harrisburg, but the southern two-thirds of Pennsylvania is one of the best regions for the York Imperial. It prefers a rather deep, fine-grained soil, one containing a sufficient proportion of the coarser soil particles so that it will not clog when worked. Now, then, in Chester county the Chester loam produces the York Imperial very well. There are other varieties that you grow well, but this is one of the best commercial varieties. There are considerable areas of soil in what the Bureau of Soils has classified in Pennsylvania as the Hagerstown series of soils to which the Mammoth Black Twig, and some of the other varieties mentioned a few minutes ago, are not so well adapted, that are well suited to the York.

MR. BRINTON.—I would like to ask a question regarding the York Imperial before you finish over in Chester county. I have thirty acres over there on a foundation of feldspar. When the top soil is washed out, it makes a very good building sand. The drift from the upper side is collected on the lower side. It lies towards the north, and covers about thirty acres. I find considerable rock in it, which is much harder than the other; it seems to be more of a granite.

THE PRESIDENT.—I would suggest that the speaker reserve his questions until Prof. Wilder has finished his address.

MR. BRINTON.—I beg your pardon; I thought you wanted the questions now.

PROF. WILDER.—The next variety for our consideration is the Baldwin, which is adapted in general to the northern part of Pennsylvania, along the line with New York. The Baldwin prefers a surface soil ranging from a heavy, fine, sandy loam to a medium mellow loam, with a preference for the latter, while the subsoil should be a mellow medium loam, though it may be a plastic clay loam. But there may be other combinations of soil texture and arrangement which would also be favorable to the Baldwin, and such soils do occur in this State. That is, a soil might contain from 25 to 30 per cent. of clay, provided that the rest of the soil content were largely medium sand instead of silt and very fine sand, as this would give an open texture, whereas if the silt content were high it would be more suitable for the Rhode Island Greening, or Grimes, or Fall Pippin. That is, the Baldwin soil must be moderately porous, and not compact and heavy.

There is one other illustration of the Baldwin adaptation that I would like to call to your attention. The soil for the Baldwin should

not be one that produces the most luxuriant growth of forage crops, but rather a moderate growth—a soil upon which some of the lower corn leaves will cure down before time to harvest, and produce a good yield of ear corn, but only a moderate crop of ensilage corn. Note the contrast in this respect with the Rhode Island Greening soil, which should retain the lower corn leaves green until late in the season. Now, this same kind of soil or Baldwin soil, as we go south, is found to be adapted to another variety, the Rome Beauty.

We might pause here to illustrate the relation of soil to climate. In any considerable region we find a given set of climatic conditions—that is, the conditions are variable but they are consistently variable, and in that region certain soils may be adapted to certain varieties of apples or peaches, for instance the adaptation of the Baldwin as already described. But if we go into a different set of climatic conditions, we shall find that a similar character of soil may be adapted to another variety, such as the Rome Beauty, and, in fact, we do find that southwest of here, in West Virginia for example, that we have passed beyond the climatic range best suited to the Baldwin as it becomes a fall apple there, but throughout that general set of climatic factors the Rome Beauty is the variety best adapted to that grade of soil.

Soil for the King should be slightly heavier than for the Baldwin to give a more luxuriant growth of tree and fruit, yet as it is a red apple it must not be planted on too rich ground. Ensilage corn ground is not suitable, and the lighter Baldwin soil is too light. A moderately rapid growth is required both to produce a good tree of this variety and to get fruit of good size, yet the soil must be open enough to avoid the greenish look and undeveloped color brought about by unsuitable soil conditions. Hence, it will be seen that the King is peculiarly exacting in its soil requirements.

We will not take up the variety that prefers the lightest soil we shall consider. The Hubbardston, which succeeds so well in New England and parts of New York and Northern Pennsylvania, grows to perfection on a deep, fine, sandy loam, moderately rich. That is, on a soil a little heavier than a peach soil—if we adopt the soil ideal of the coastal plain region for that fruit. If the soil is too light, the Hubbardston is too small, and if too heavy the fruit does not color as it should and the skins are greasy. Hence, the soil should be very mellow and rather light, yet rich enough to produce a moderately rapid growth. Then it will grow large and also be more resistant to the apple maggot where this pest is troublesome.

A variety which follows closely on the Hubbardston is the Smokehouse—a very popular apple of Pennsylvania. This apple succeeds on the heavier Hubbardston soils and grades over in adaptation upon the lighter Baldwin soils—a very profitable apple in Pennsylvania markets when well grown.

But we sometimes have another problem in soil investigations; a favorite variety of some locality no longer does well, and we often hear that it has "run out," that for some unassignable reason it can no longer be successfully grown. This can be traced in many cases to soil conditions, in that it has been planted on all kinds of soils indiscriminately, and on unfavorable soils the variety not only does not grow well, but is also more susceptible to disease. I have tried to bring out as shown by the work of the Department the adaptation of

some particular variety of fruit to each general grade of soil, beginning with the heaviest soils adapted to apple growing and ending with the lightest. These representative grades of soil may be likened to the rungs of a ladder from the bottom to the top, and it is hoped as fast as the work can go on that the individual requirements and preferences of the different varieties of apples and other fruits may be definitely worked out, thereby not only saving enormous sums in the aggregate each year, but also making it possible for the orchardist or farmer, whether large or small, to select the most favorable soils available, and choose the varieties of fruits to which these soils are best adapted, so that all risk of adaptation to orcharding and varieties will be eliminated, thus adding a most important element of insurance to every orcharding project. I have tried not to put the rungs of this ladder so near together that it would be difficult to distinguish the general class of soil which each rung represents. It very often happens, of course, that more than one variety is adapted to one of these general classes, and it also happens that some variety may prefer a kind of soil which represents parts of two grades I have given, but many varieties have a limited range of soil preference which may be defined as a unit.

Other fruits than the apple—particularly the pear and the peach—show decided indications in adaptation for many of the different varieties to special soil conditions, similar to the line of adaptations mentioned for the different varieties of apples. A considerable number of these have already been worked out and investigations are now being carried on whereby it is hoped that the soil adaptations of all the leading varieties of these fruits also may be accurately determined.

Now, if there are any points in this matter which I have not made clear to you, I shall be glad to try to answer them, if there is sufficient time.

MR. ROBERTS.—In regard to the Baldwin apple, you can't get a better Baldwin anywhere than those grown in Chester county, not even up in New York, and yet you say Chester county has not the proper soil for it.

PROF. WILDER.—I am glad you brought up that point. Those grown in Chester county are all right, but there are better climatic and soil conditions elsewhere. While you can grow a first-class lot of Baldwins in Chester county, there are other varieties that are better adapted to the soil there. Take the York Imperial, for instance; that is better adapted to Chester county soil. The Baldwin needs a later fall than Chester county has to make it profitable, for it ripens there too early for the development of its best keeping qualities.

A MEMBER.—I would like to ask you whether your soil preference for the Northern Spy is a matter of fruit, or whether it is a question of growing the tree? We, down here, are frequently advised to plant the Northern Spy as a stock on which to graft the Grimes, and I have been wondering whether it would be safe?

PROF. WILDER.—To your first question I would reply, both as to quality of fruit and character of tree growth. I would not hesitate to use the Northern Spy for a grafting stock, although I would not

plant it down here as a fruit, because it is a fall apple, and as such will not bring a good price. Up in Northern Pennsylvania and New York they can produce the Spy as a winter apple. Here, in this part of Pennsylvania, you can grow the Smokehouse for the fall trade.

A MEMBER.—How about Stayman Winesap?

PROF. WILDER.—Right through here, I think it is a good variety to plant.

A MEMBER.—What character of soil does it require?

PROF. WILDER.—One with not too much sand—about a medium soil. There is an ironstone ridge beginning over in Berks county, at Dr. Funk's; in fact, I think this particular ridge starts in Bucks county, extends through Berks, and then on to Harrisburg. All that soil, I think, is very good for the Stayman. Considerable attention has been paid in this State to this variety. Dr. Funk has a fine orchard of them. Then, I know of another excellent Stayman Winesap orchard near Waynesboro, Virginia, where the trees are nineteen years old, I think, and they were carrying a heavy crop when I was there last fall. I was there when the fruit was being picked, and these trees produced excellent specimens of fruit. These trees were grown on just about the same character of soil as that mentioned.

A MEMBER.—What are the elements in the soil that give the solor to the fruit?

PROF. WILDER.—I can't tell you. In the first place, drainage is one; in fact, the soil must be well drained, if good color is to be obtained.

A MEMBER.—But will iron in a soil produce the highest color?

PROF. WILDER.—I thought that was what you were getting at; I don't know. I do know that the soil which is commonly spoken of as iron ore soil in this State produces a very good colored fruit, but whether the iron produces the color or not I don't know; then, we have the shale soil, and in this State we have the Penn series of red sandstone soils, with a different color, both of which produce fruit of good color.

A MEMBER.—Is potash in the soil beneficial to the growth of the tree?

PROF. WILDER.—My belief is that it is, but how much of it any particular soil may need as an application is another question.

A MEMBER.—Does the Jonathan do well in the soil of Southeastern Pennsylvania?

PROF. WILDER.—If a man has the right soil it will do well, but there are other localities in which it will do better, because it calls for a long season with a great deal of sunlight for its proper develop-

ment. However, I have not seen enough of the Jonathan to give a positive opinion. In the northern part of the State I would not plant it at all.

A MEMBER.—You mean it will do better in the southern part?

PROF. WILDER.—Yes; in general; in the Ozarks it reaches its highest quality and produces there about 60 per cent. as much as the Ben Davis.

A MEMBER.—In this section, what is the best quality you can recommend?

PROF. WILDER.—As a commercial variety, the Stayman Winesap is one of the best in this respect.

A MEMBER.—In the northern part of the State, on red shale soil, would the Stayman do well?

PROF. WILDER.—I think it would.

A MEMBER.—Would it do well where the Baldwin does well?

PROF. WILDER.—I should think it would, although for the Stayman we do not want a very light soil. It prefers a rather heavier soil than the Baldwin.

A MEMBER.—What about the Roxbury Russet?

PROF. WILDER.—I don't know; I have never done any work with that variety, and so don't like to say anything about it, but I don't believe it would do well, except possibly in the northern part of the State.

PROF. SURFACE.—Would a northern slope retard the development of the Baldwin in the southern part of the State?

PROF. WILDER.—I think it would, in a measure, but probably not enough to prevent its ripening too early. If I were going to plant the Baldwin in your section of the State, I would plant it in a little heavier soil, to retard the development.

PROF. SURFACE.—Suppose you do not have that soil, could you bring about those conditions by cover crop plowed down, and manure?

PROF. WILDER.—What is your original soil?

PROF. SURFACE.—Sort of a light shale, such as you saw there. I want to plant some Baldwins there.

PROF. WILDER.—What is it—that heavy, silty loam?

PROF. SURFACE.—It is, but I do not consider it very extra fertile.

PROF. WILDER.—So far as that is concerned, I would not hesitate to put the Baldwin on a soil that is not very productive. I would rather put it there than on a soil that is very productive. If the soil is not too rich, the fruit of that variety matures better.

DR. HUNT.—You have spoken this morning almost exclusively about soil types; are you prepared to tell us about the soil series of Pennsylvania?

PROF. WILDER.—As far as the fruit production is concerned?

DR. HUNT.—Yes; but you might extend the question, and tell us the differences between the soils.

PROF. WILDER.—In Pennsylvania we have series of limestone soils, sandstone soils, and granitic soils. The limestone soils are never sandy. Now, the first is a series which occurs in the limestone valleys and the Department ha named it the Hagerstown series. The first work on mapping this series was done at Hagerstown, Md., and they have taken that name to designate the soil series. There is no significance in the fact that Hagerstown gives its name to the soil series; it is simply a local name taken as a matter of convenience from the region where the soil is first mapped so that we can describe the soils systematically.

The red sandstone soil in this State is of two kinds, one derived from the Mesozoic period. That soil we run across down in Lebanon county, and it has been called the Penn series. I suppose Mr. Smith, in mapping this series, named it for William Penn. I simply mention this to show you that we do not attach any particular significance to names, except to call the series to our attention. Now, we name all the soils coming from this material, the Penn soils, and divide them into a general series of types. The coarse ones are sand, and the finest clay, but there are a good many between the two, simply a difference in texture, running from the heavy clay to the coarse sand: first comes the clay, the finest particles; then silt; then very fine sand; then fine sand; then medium sand; then coarse sand; then fine gravel; then coarse gravel. It is simply a convenient method of classification.

A MEMBER.—Are you acquainted with the pine ground land, in the Cumberland Valley?

PROF. WILDER.—You mean where most of the South Mountain orchards are located?

A MEMBER.—Yes.

PROF. WILDER.—Yes; I have been there.

A MEMBER.—What varieties will do well there?

PROF. WILDER.—York Imperial and Ben Davis.

A MEMBER.—What about the Grimes?

PROF. WILDER.—I think there is a good bit of difference in the soil which you class as pine ground. On some of the soil there, I think, the Grimes would do very well, and you could be guided in choice of soil by the soil description for that variety.

A MEMBER.—What three or four varieties of apples would you recommend for the southern part of Lancaster county? Our soil is about the same as Chester county.

PROF. WILDER.—I think some of those I have just mentioned would do very well. Personally. I would not plant the Baldwin, but if you want to include it, it would be all right. We have heard here this morning that it is possible to keep the Baldwin on the tree by spraying and keeping the leaves on. I think there is something in that.

A MEMBER.—Besides York Imperial, with what other varieties would you begin?

PROF. WILDER.—I would have to see the soil before being more specific, but I think I would take the York Imperial, the Grimes, the Stayman Winesap, and the York Stripe.

A MEMBER.—What about the Nero?

PROF. WILDER.—I don't know anything about it.

A MEMBER.—What about the Rome Beauty in that region; would it do well?

PROF. WILDER.—Yes, on that soil; I would rather plant it there than the Baldwin.

A MEMBER.—What about the Smith's Cider?

PROF. WILDER.—I would say it might be all right, but I don't know definitely the character of soil best adapted to that variety.

DR. HUNT.—I want to press this a little farther; in taking exactly the same types of soil, in exactly the same series, whether one is more productive in certain localities than the other? Take the Hagerstown and Penn series; is it not well for Pennsylvania fruit growers to know if there is one series better than the other, so far as it affects the apple production, the same as in grain growing? Would it not be wise to locate the different series, so that the fruit grower may know?

PROF. WILDER.—Do you want me to go into it?

DR. HUNT.—Yes, if you will.

PROF. WILDER.—The Penn series begins in the northern part of Berks, extends into Montgomery, and thence over into Lancaster, as I remember. Now, that series, as a series, is not adapted to orcharding, I would say. In some cases the shale is too near the surface;

in some other places it is rather low lying, and these areas are not good. Then, farther east, the altitude is pretty low, and many varieties will not grow there, although the same series occurs also over in Adams county, where they have very fine orchards.

The Hagerstown series, the loam, and silt loam of the Penn series, and well elevated areas of the Chester soils are well adapted to orcharding in general. In Adams county excellent results have been obtained with both peaches and apples.

Now, when we get to the limestone region, this is what one almost always hears: that the price of land is so high that we can never plant fruit trees on it. In some places in the Lebanon Valley it runs as high as two hundred to two hundred and fifty or three hundred dollars an acre, and we can find soil just as well adapted to our purpose at fifty dollars an acre.

The DeKalb series, which I did not mention, includes most of the shale hills of the State, of which there are many. This series is usually much less productive and very much cheaper, but in many localities it still adapted to fruit.

There is one other thing, in closing, that I want to call attention to. I was in the Ozark region two years ago, and spent the whole year there, and they told me that they had not had a good, profitable apple crop since 1901. What would you fellows think if you had only one profitable apple crop in five years? Many houses were built there in 1901, during the boom time, and they depended on their apple crops to pay for them, but they did not have another good crop until 1906. They had one or two crops in the interval that just about paid expenses. Now, if that is the condition in the Ozark region, the region about which we hear so much, how about orcharding here in Pennsylvania with all its advantages in orcharding, where you get a crop every other year, and have more accessible markets? I mention this simply to call attention to the fact that there is a wonderful opportunity for increasing the fruit production in this State. I thank you for your attention.

Adjourned.

WEDNESDAY, JANUARY 15, 1908.—2 P. M.

The meeting came to order with President Hiester in the Chair.

THE PRESIDENT.—I have been requested to appoint delegates to the Allied Agricultural Interests that will meet in Harrisburg on January 21st—I think that is next Tuesday—at 2 o'clock, for the purpose of considering question as related to agricultural education, particularly with reference to State College. I think this Society should be represented, and I will therefore appoint for that purpose, Mr. R. M. Alden, Mr. D. L. Hartman, Mr. Chester J. Tyson and Mr. Enos B. Engle. We want to get into closer touch with the agricultural interests at State College. They have just organized a Department of Horticulture up there, and we want to keep in touch with it.

Is the Committee on Nomenclature and Exhibits ready to report?

MR. HARTMAN, Chairman, submitted the following:

REPORT OF COMMITTEE ON NOMENCLATURE AND EXHIBITS.

Mr. President and Members of the State Horticultural Association of Pennsylvania: Your committee respectfully requests leniency in your judgment of our efforts, in view of the unusual size of the present exhibit and the limited amount of time available for our work.

It appears to be the unanimous opinion of all present, that this exhibit both in extent and quality exceeds any previous effort of the Association. The number of plates of apples and various other horticultural products, totals 421. The apple, as usual, is the prominent feature of the display, though the display of nuts by Mr. Rush is interesting and creditable.

The thanks of the Association are due to B. F. Barr & Co., for a touch of color and beauty, by the contribution of a number of choice flowers and plants to the display.

In other lines of large horticultural activity in the State, we are sorry to note, that, as usual, the display is very deficient. To Prof. H. A. Surface and Mrs. Surface, are due the credit of a small exhibit, consisting of one plate of fine potatoes, and a can of tomatoes, which serve to remind us of the vast interest of trucking and market gardening, which we are prone to forget are a legitimate branch of horticulture. The committee recommends a wider interest in the exhibit of vegetables, small fruits and grapes.

There are seventy-seven individual contributors to this display.

Of apples there are fifty-eight named varieties, and fifteen unnamed varieties. Of the unnamed varieties, probably the greater number are seedlings, as we succeeded in recognizing very few. A few of these seem to possess special merit.

In behalf of the Association, we thank each and every contributor to the display, but because of the long list, we beg to be excused from personal mention, except in a few cases of exceptional merit.

The awards recommended by this committee are as follows:

Diploma for excellence of collective exhibit of apples, The Fruit Growers' Association of Adams County.

Diploma for excellence of individual display of apples, R. M. Elden, Bendersville, Pa.

Diploma for great variety and general excellence of display of apples, Dr. I. H. Mayer & Son, Willow St., Pa.

Diploma for the championship of the nut industry of Pennsylvania, Mr. John G. Rush, West Willow, Pa.

The committee calls special attention to the collective exhibit of Snyder county, special credit for which is due to T. C. Foster, Winfield, Pa.

We commend this added move toward collective county displays.

We call attention to a plate of Seckel pears exhibited, as usual, by J. Hibbard Bartram, West Chester.

The photograhpic exhibit of orchard work and orchard scenes, together with the information in regard to acreage, age of trees, and financial returns of various orchards shown, by the Adams County Fruit Growers' Association, is of special interest and value.

The five varieties of apples most largely represented in the exhibit are: York Imperial, 63 plates; Smith Cider, 21 plates; Ben Davis, 20 plates; Baldwin, 17 plates, and Grimes' Golden, 10 plates.

The thanks of this committee are due to J. E. Jamison and others, for their assistance in the work incident to the preparation of this report.

Unfortunately, the fine collection of fruit intended for exhibition by Mr. Hiester was delayed in shipment, and did not arrive until after this report was prepared. The value of this collection centers in five plates of magnificent specimens of as many varieties of pears.

We note that there are still belated additions being made to the already unusually large exhibit, as we close the report.

Respectfully submitted,
D. L. HARTMAN,
C. P. SCHOLL,
JOSIAH W. PRICKETT,
Committee.

A motion that the report be accepted with the thanks of the Association was duly seconded and carried.

THE PRESIDENT.—We will now continue with this morning's program. We will have several five-minute talks on different varieties of fruit, and I would remind the gentlemen who are called upon that our time is limited. We are going on with our program up to half-past five this afternoon, and if each speaker keeps to his five minutes, we will have all the time we need. The first subject on the program is "Apples," by Hon. W. T. Creasy. Is Mr. Creasy in the audience? It seems he is not here. I will, therefore, call on Mr. A. I. Weidner to respond in Mr. Creasy's place.

MR. WEIDNER.—Mr. Chairman, this is rather sudden, and I am not prepared to take Mr. Creasy's place, but in his absence I will endeavor to say a few words.

In regard to the varieties for family use, I think that one of the first I would recommend is the Yellow Transparent, an early apple, and an apple of very good quality. Second, I would suggest the Summer Seek-no-Further, an excellent apple that comes in very early. The Summer Rambo is another apple that I think very highly of. It makes a very good appearance, and is of high quality. Then, I would not forget the old stand-by, the Smokehouse. I don't think we have any better apple in its season, and it is excellent for canning, for people who use apples in that way.

For fall use, I would speak of the Grimes' Golden. I do not think we have an apple of higher quality growing in our section. It yields and produces well. I think the Jonathan is another very excellent apple of high quality and good color. While we cannot, perhaps, grow it to perfection, as they can further south, yet I think it is an apple that would do very well in Southern Pennsylvania.

For commercial orchards, I would recommend first, our old standby, the York Imperial. While I don't claim it to be an apple of high quality, we have no other, especially in Southern Pennsylvania, that will equal it as a money-maker. It is of fair size, good color, keeps well and an excellent apple for Southern Pennsylvania.

We also grow the Ben Davis; that is an apple that commences to bear early, of good color and size, but with that all is said. The quality is, I think, the poorest of any we grow in Adams county. I

have them in my cellar now. No one wants the Ben Davis while there are other apples there.

The Grimes' Golden, can, I think, be grown successfully as a commercial apple in the southern part of Pennsylvania. As I said before, it is an apple of high quality.

The Stayman Winesap is another apple that we grow very successfully in Adams County, and I think it will do well in Southern Pennsylvania.

THE PRESIDENT.—The next subject is "Pears," opened by Miss Mary M. Haines, Cheltenham, Pa.

PEARS FOR MARKET AND FOR HOME USES.

In looking into the subject assigned to me, I was much interested in some statements made by Mr. A. J. Downing, in his book, "Fruit and Fruit Trees of America," written now 50 years ago. According to Mr. Downing, pears were cultivated in Syria, Greece and Egypt in very ancient times, and were known to the early Romans, but apparently not so favorably known as to the present-day Americans, for one of the early writers says, "All pears whatsoever are but a heavy meat unless they are well boiled or baked." It was left to the seventeenth century to develop the really delicious qualities of the fruit when English and Continental growers vied with each other in their productions. Belgium produced many varieties and is spoken of as the Eden of the pear tree.

Under the more modern cultivators, varieties increased rapidly and we are told that in the middle of the last century "more than 700 kinds, collected from all parts of the world, had been proved in the celebrated experimental garden of the Horticultural Society of London;" of course, many of these were of little or no value and were soon lost sight of. But, from the long list which was left, and which has since been added to, it is difficult to make a selection to suit all tastes. One's early prejudices cannot fail to enter into the choice, and what one person might recommend another would cast aside. Again, many varieties that are excellent for home use would not answer for a commercial orchard, or those grown in one locality very satisfactroily may not succeed at all in another.

In gathering the fruit, especially for home use, it is well to bear in mind the rule that, with few exceptions, pears are much better in flavor and also often more highly colored if picked early and ripened in the house, the time to gather them being indicated by the size and coloring of the fruit and also by the readiness with which the pear separates from its branch when it is gently raised from its hanging position.

When the fruit is gathered it may be spread out on the floor of a cool, dry room or cellar to ripen; certain choice varieties may be laid between the folds of an old blanket while ripening, and both flavor and color will be improved. Winter peas may be wrapped singly in paper or packed in straw and left in boxes till near the time they are wanted, when a few days in a warmer room will improve them. Perhaps no other fruit unless it be peaches is so sensitive to the difference between rough and tender handling, and it makes me

shudder to see the way these fruits are sometimes poured from one basket into another, bruising the tender skin and making a center for decay to start. We do not pour eggs from one basket into another—why pears or peaches?

In select varieties of pears for market purposes, those which are fine in appearance, and generally the larger the better, and rather firm in texture, will be the most profitable.

Bartlett heads the list, for home or market gardens, and when one says Bartlett no further word of recommendation is needed. The Seckel also needs no introduction, an American variety with an interesting history as related by Mr. Downing, a favorite with every one; this pear especially is improved by the blanket treatment while ripening. Last October, our own pears having gone the way all good pears should go, we purchased some Seckels for the benefit of an English guest; they were procured from a vendor on the street, but were of good size and sound, though unripe and quite hard, and of the usual russet color; they were placed in a tempered room between folds of flannel and in a few days were ripe and delicious and also finely colored. A late summer pear that sells well to a certain class of purchasers, is fine in appearance and juicy, though rather coarse grained, is the Boussock; if gathered early it ripens slowly and can be marketed during several weeks without any cold storage aid. Probably the pear that has been most planted commercially, especially during the last few years, though one hesitates to mention it here, is the Kieffer; but it has its friends as well as its foes, and a well-ripened Kieffer pear is by no means to be despised, while for preserving or spicing it stands near the head of the list. The Lawrence is a good pear for market and when well grown and carefully ripened is very satisfactory. But I am sure there are commercial growers here who will want to add other varieties to this list, so I will pass on to the home orchards, which is a more familiar field to me.

Brought up from my earliest childhood with an abundance of pears on our own home grounds, we became acquainted with many varieties which were then popular, among them several kinds which have now been lost sight of and given place to others. One of these lost kinds which is much to be regretted is the Ott, a seedling of the Seckel, small, roundish pear, greenish yellow in color, very sweet, rich and juicy in flavor, ripening in August, a kind that it is safe to eat in the dark, leaving only the stem in one's hand for, in handling many bushels I have seldom found an imperfect pear, even though the trees have not been sprayed.

From my own home experinence, therefore, if selecting a list of pears for the home orchard, I would choose in addition to those already named such a variety as would insure a continuous supply. Beginning with Dearborn seedling, a small but sweet and juicy pear, though now rather difficult to find in any nursery, I fear. Madelaine, larger than the former and more tender and juicy and one of the earliest to ripen. Manning's Elizabeth, small to medium, but sweet and good, yellowish in color with red and russet shading towards the blossom end. Koonce, also a very early variety, highly colored and much recommended. Brandywine, a delicious, spicy pear, originating in Chester county. Clapp's Favorite, equal in appearance and almost in flavor to the Bartlett; its chief trouble is its poor keeping properties, for a beautiful exterior may be but a shell concealing a rotten

and worthless heart; if gathered at just the right time, however, and carefully handled, it is very good and one season, when Bartletts were scarce, we used Clapp's Favorite for preserving, and I doubt whether many persons would have noticed the difference. The Washington, a stray seedling found in a Delaware hedge row and named in honor of the Father of his country, varies greatly with soil and location, but I have seen them nearly as large as a fair-sized Bartlett, rich in flavor and color. Belle Lucrative reminds one of "the little girl who had a curl right in the middle of her forehead, when she was good she was very, very good and when she was bad she was horrid;" they may be delicious and of fine flavor, but they may be absolutely flavorless, hardly even sweet. The Flemish Beauty, as I remember it as a child, was always cracked and imperfect—if one could find a good bite, however, it repaid one for the effort! No doubt, in these days of spraying, this trouble would be overcome, and if so this pear would be a good addition to the family or the market orchard. The Sheldon is a good pear and ripens well; it is fine in flavor and juicy, rather larger than the Buffum though not so fine in grain. Vermont Beauty is one of the newer pears, very attractive in appearance as its name indicates, and of good flavor and keeping qualities. Of all the late pears I think there is none better than the Urbaniste; it ripens on the tree or in the house. I have picked up delicious fruit from the ground quite late in the season; the only trouble being that it is a rather shy and uncertain bearer. Lawrence, we have had until Christmas or later, with no other care than careful handling and packing in straw in the cellar. Winter Nelis is a rough-looking, smallish, brown pear, but juicy and very sweet. The Rutter is rather large and coarse grained, but well flavored and late. For a good late cooking pear the Vicar of Winkfield is considered by some as second to none; it does not ripen until January.

In giving the above list, I have omitted some excellent varieties which it is now difficult to find in nurseries, and others which will no doubt be named in the discussion to follow.

In planting pear trees it is well to remember that a pear tree may last for generations and its situation should be chosen with this end in view. Mr. Downing mentions several that were known to be near 400 years old. Some varieties of standard pears make large trees. We have a Catherine pear tree that is about sixty years old and is nearly as many feet in height, though this is not an advantage.

The home orchard may return quite a fair profit from the sale of surplus fruit, especially if peaches are scarce, but even for the comfort and pleasure of the family every one should plant pear trees.

In conclusion, let me remind you of the old saying to be observed when eating pears: "Never pare a pear." To all good rules, there are exceptions, but the explanation given for this is reasonable and is that the special flavoring sacs or glands lie very close under the skin and are apt to be removed with the skin, therefore "Never pare a pear."

ADDITIONAL LIST OF GOOD PEARS.

Doyenne D'Été, ripens middle of July; small, yellow and red.
Lawson, middle of July; large, handsome, good for maket.
Osband's Summer, August; medium, yellow, red cheek.
Kirtland, August and September; russet, medium.
Howell, large, yellow; September.

Louise Bonne, September and October; large, pale green.
Clairgeau, October, very large; cinnamon, russet.
Duchess d'Angouleme, October; large, yellow.
Beurre d'Anjou, October and November; large, light green.
Idaho, October or later; large, coarse, dull green.
Columbia Vergelieu, late, large, greenish.

THE PRESIDENT.—The next subject is "Peaches," by W. H. Stout, Pinegrove, Pa. Mr. Stout is unable to be present, but he has set a letter which will now be read by the Secretary:

Enos B. Engle, Secretary, Harrisburg, Pa.:

Dear Sir—The following are the varieties of peaches we now have under cultivation, and have had within recent years: Stump, Gold, Rareripe (x), Old Mixon free (x), Mountain Rose, Crawford's Early (x), Crawford's Late (x), Late Rose (x), Iron Mountain (x), Wheatland, Old, Mixon Cling, Globe, Elberta (x), Reeves' Favorite (x).

Those marked (x) produced satisfactory crops; the others were worthless or inferior, not suited to the location. For several years the crops failed, owing to the freezing of the buds or the blossoms after opening.

Have not acquired the talent to produce fruit every year under all contingencies, although we have had bumper crops occasionally, under same treatment of heavy fertilizing, cultivating and thinning.

Hoping you will have a full house, interesting and profitable discussions. I am,

Yours truly,
W. H. STOUT.

THE PRESIDENT.—The next is "Plums," by L. G. Youngs. He also sends a letter, which will be read by the Secretary.

North East, Pa., *Jan.* 9, 1908.

Mr. E. B. Engle, Secretary of Pennsylvania Horticultural Society:

Dear Sir and Friend—As I may not be able to get from home owing to sickness in my family, I will state briefly my experience with varieties of plums, and name those I have best succeeded with. I think, in the light of my experience, I would leave out the Japan plums entirely. There are only two varieties I could be induced to plant, and those are Red June, for early, and Burbank. These are often killed in fruit bud, and are uncertain and unsatisfactory croppers, so I will not put them into my list, although you know I have several hundreds in my orchards. The list, then, will be exclusively European, for the American type has little to recommend them. I want also varieties that have the bearing habit, are as near annual bearers as I can get them. I also want varieties that will give me fruit continuously for my customers, and the order of ripening is about as listed for the commercial orchard: Moore's Arctic,* Field, Bradshaw,* Imperial Gage, Gueii, Lombard,* Shipper's Pride, Shropshire Damson,* York State Prune,* German Prune,* Grand Duke. To this could be added Pond's Seedling, sold sometimes as Hungarian Prunes. There are some of these that are not very good in quality. Those I would consider for home use I have marked with an asterisk. The

Lombard, Bradshaw (or Niagara), York State, and German Prune, I would set more largely in a commercial orchard than other varieties. The York State and medium type of the German Prune are distinct types of the German Prune (I am now convinced the Fellemburg and the York State is not the same). The York State, as grown at Dansville, N. Y., is of German origin, but is earlier and larger than the ordinary type of German Prune. I would also set quite largely of Shropshire Damson, or some other good Damson, as they are wanted for preserving and the demand is not supplied of late years. Preserving companies paid as high as six and seven cents per pound for the fruit this year, or $3.00 to $3.50 per bushel, which is a very satisfactory price. There are other good plums that might succeed better in some localities than those I have listed, but the list as a whole will be found generally satisfactory for those who grow for market. Another thing: get trees on Myrobolan stock.

Now, Brother Engle, I believe I have outlined the question, and another year I hope to meet you all at Harrisburg; you can then "shake the plum tree" to better advantage. Yours truly,

L. G. YOUNGS.

THE PRESIDENT.—Next comes "Cherries," by Calvin Cooper, Bird-in-Hand, Pa.

Mr. Chairman, Ladies and Gentlemen: Your committee, I think, has chosen a very poor man to recommend the cherry. Although I like to eat cherries, I find them very hard to get in our country. The robins and other birds get about seven-eighths of the crop, and what they don't get the boys do, particularly the varieties we like best. Still, I endeavor to have some growing, to feed them, and sometimes there are a few left for us.

The varieties we have on our grounds are the following. I am sorry, I have mislaid my list, but I will endeavor to mention a few varieties from memory.

The Cumberland is a good cherry, but we cannot get them; the birds get the best of them. The Lancaster is another. This variety was developed from a seedling that was sprouted by an old friend of mine who had a tree on some ground near the city. This is the most attractive cherry we have, and one less likely to be taken by the birds; it has a solid red flesh, just sufficiently acid, and is a good bearer. Its acidity makes it desirable for canning purposes, and not so attractive to the birds as the sweeter varieties.

Among the tart varieties, we like our old sour cherry best. I can't recollect the name of it. The point is this: you can grow the trees on our soil without much difficulty, but unless we can devise some plan by which we can get ahead of the birds, there is not much profit in growing cherries.

THE PRESIDENT.—The next subject, "Grapes and Small Fruits," by William Banks. Mr. Banks is unable to be present, so I will call on Mr. D. L. Hartman to talk on this subject.

MR. HARTMAN.—*Mr. Chairman and Friends of the Association:* This subject has taken me a little unexpected, and it is rather a large one, since it takes in small fruits and grapes. This embraces straw-

berries, raspberries, gooseberries, currants and grapes. That is rather a wide subject to condense into five minutes, and by the time I have my ideas settled down to the subject, my five minutes will be up. This subject reminds me somewhat of the little boy, who had just moved into a neighborhood, and was new to it; he went into the grocery store, and after he had made his purchase, he told the storekeeper "you just charge that to my pa." "But," the storekeeper told him, "I don't know your pa." "You don't know my pa? Why, I know him just as good as anything." So, like the little boy knew his pa, I may know my own varieties "just as good as anything," but they may not fill your needs. However I will tell you what varieties I have, and what I have noticed in the market.

Take the strawberries: I suppose if you were to take a vote of our markets at Harrisburg, the majority would favor the Bubach. I have never grown them, but they certainly come to our markets. Possibly next to them, in our market, would be the Cumberland. That used to be an old stand-by. I think there is a new variety of it catalogued, but I am not sure about that. That is the name it is known by in the old catalogue. After that, I am not sure but that the vote would be rather scattered. Of five varieties, I do not think the vote would agree on any two of the five.

Now, of the other varieties represented there, I have planted the Senator Dunlap and the Cora Belle. The other three I did not plant—the Cumberland and the—I guess I will not get the other two just now—Splendid and Excelsior.

PROF. SURFACE.—How is the Haverland?

MR. HARTMAN.—The Haverland is very good, and would probably get a very large vote in the Harrisburg market. It looks nice, and has a nice flavor—possibly a little flatter than some of the others.

The William Belt has given me a good crop, but this last year, I am sorry to say, it was something of a disappointment; but when you do get these berries they are something to be remembered. They are of a good, firm flesh, and sweet, but since they disappointed me last summer, I would not recommend them.

The raspberry I grow, both red and black. Perhaps I had better give you the standing of our markets. I think if you were to take a vote on the blacks, it would fall in this order: the Cumberland and then the Eureka. This raspberry seems to be very prominent on the market and appears to be very profitable, but the Black-cap, on which I have made my money, is the Kansas, a magnificent variety, which is especially good the first year it comes into bearing, but it is a decided draw-back some years, when the weather conditions are not what they should be, and they are liable to crumble certain years. That is the only failing I have noticed. It is the best money-maker, and commences to bear earlier, I think, than any other variety. The second year I had the Cumberland, which sold at eight cents a box, and the whole crop was worth something over three hundred dollars to me.

Now, as to the reds, I have the Cuthbert, Turner, King and some Millers—I think more Millers than Kings. Referring again to our market, I should judge if you were to take a vote on the reds, it would be very heartily in favor of the Cuthbert. As I understand it, this is productive, but does not grow easily. As I have observed it, it

makes a productive growth the first year after planting, and gives a good crop, but by the second year the yield begins to fall off, and at the end of the third or fourth year the Cuthbert bush would bear no more.

The Turner is almost too soft to handle nicely, but it is one of the best we have, and one of the earliest, and I have found it very profitable. I have made more money through this than through any other variety, because I have more planted than any other kind. Just one more point in its favor is this: that it will bear year after year. I believe that you can take them for twenty years, and they will bear right along and still be sweet. We have picked from these bushes for seven or eight years, and they are in excellent condition.

The Miller has been very widely catalogued, and I have this to say of it: it is the handsomest berry I have ever seen, almost as solid as a blackcap, stands all kinds of weather, and is one of the earliest, but I would prefer that some one else should do the eating of it. It is not a sweet variety, but if you get your money, and let some one else do the eating of it, you are all right.

One of the best of the sweet varieties is the Early King. They are almost as good as the Cuthbert, but they are not quite as firm, but they are very nearly as firm as the Miller, and of very much better quality. They have just a little of the fault that we find in the Kansas, under certain conditions, but I believe it is a very profitable variety.

THE PRESIDENT.—I am sorry to say that your time is up.

MR. COOPER.—I have found my list of cherries; if you want them, I will give them to you.

THE PRESIDENT.—We can spare you a few minutes, Mr. Cooper.

MR. COOPER.—These are the varieties we find best: The Belle de Choisy, the Governor Wood (early), English Morello, the Lancaster, the Black Heart. The Belle de Choisy is the finest on the list. It is just sufficiently sour to keep the birds from destroying it, particularly if they have a good sweet cherry near by.

I would say this to those who want to grow cherries: grow your own trees; don't depend on the nurseries. Get a seedling somewhere, and get the branches started not more than three feet high, then bud or graft it, and you will have a good tree.

THE PRESIDENT.—We are fortunate enough to have with us a delegate from a sister State, the President of the New Jersey State Horticultural Association. We would like to hear a few words from Mr. Roberts, of New Jersey.

MR. ROBERTS.—You are very kind to give me this opportunity to extend to you the greetings of the New Jersey State Association. We appreciate your action in sending two delegates to our last meeting, and our Society desires me to request you to do the same this year.

I came here as a delegate, and I have kept my eyes open, and learned a lot. I was very much interested in the talk on cherries, and would like to add a word to it. I have raised cherries for twenty years, and in order that both the birds and I can have all the cherries we want, I plant a few extra trees. In this way I have never failed to get all the cherries I want. It is a very simple matter to supply the birds. They take just so many, and then stop. I thank you.

A MEMBER.—How many acres does it take for the birds?

MR. ROBERTS.—It is not a question of acres at all; just a few trees. Sometimes, when you have a light crop, they may seem to make a big hole into it, but if you plant a sweet variety for them, they will leave your choicest kinds alone. I have found this method to pay. These few extra trees take up very little room, and I think you will find it a good plan.

THE PRESIDENT.—Our Society sent two delegates to the New Jersey Society, when they met a few weeks ago, and we would like to hear from one or the other of these delegates. Will Mr. Elden please tell us about it briefly?

MR. ELDEN.—I suggest that Mr. Tyson make this report.

MR. TYSON.—I prefer that Mr. Elden should do it.

MR. ELDEN.—In preferring Mr. Tyson, I did not mean to convey the impression to these people that we were not pleased with our reception, because we were certainly very well received. I had hoped to say this to Mr. Roberts, personally, but did not get a chance to talk to him. Last year I had the impression that they were not as frank as they should be. In our country we swap ideas very freely, and it seemed to me that these people were not willing to do that; but this year I thought they were very frank, and I was well pleased that we went. There were one or two things that I have been trying to find out for a long time, and then heard them over there. Dr. Voorhees, of the New Jersey Experiment Station, spoke on fertilizing, and told us how to use lime in orchards. If there was plenty of humus, we should use the ordinary crushed lime; if we had not plenty of humus, then we should use the carbonate of lime. I think this was worth the trip to New Jersey.

I have not the time to say what I should like to, about their meeting, so will say only this: that they showed us every courtesy, and we highly appreciate it.

THE PRESIDENT.—We will now take up the afternoon program. As you see, we have departed somewhat from our usual custom, and given the opening place to a lady. I am sorry that there are so few ladies here to hear Mrs. Surface tell us something about "Home Preservation of Fruits."

HOME PRESERVATION OF FRUITS.

MRS. H. A. SURFACE, Mechanicsburg, Pa.

Fruit is generally and erroneously regarded as a luxury, rather than as a valuable and necessary article of food, and many housewives who now stint this supply for economy's sake, would better banish rich pastry from their tables and substitute instead an abundance of fruit.

Acid fruits assist in the digestion and assimilation of carbonaceous foods, and where the diet is largely made up of fats, sweets and starchy foods, unless an abundance of fruit be eaten, or a great deal of out-door exercise taken, headaches and billiousness, neuralgia, rheumatism and kindred disorders result. For persons engaged in sedentary pursuits, fruit is as necessary as bread and meat. It is said that the acid found in most northern fruits stimulates digestion, and is in itself a nerve food. Peaches, plums, apricots and cherries abound in this acid, retaining it in a large degree when dried, and it is found also in almonds, raisins and peach pits. One or two peach pits eaten regularly after meals have been known to cure nervous forms of indigestion. Perhaps in this also lies the secret of the great condimental and food value of almonds.

Nowhere is there greater need of a generous supply of fruit than on the farm, where the diet is apt to be restricted in variety, because of the distance from markets, and no breakfast should be considered complete without fruit. Every farmer should raise a generous supply of the kinds that can be grown in his locality.

In the season when each kind of fruit is plentiful, a generous supply should be canned for the season when both fruits and vegetables are scarce. Plenty of juice from the small, juicy fruits, should be canned for refreshing drinks throughout the year.

If more fruit is raised than the famliy needs, it may be made a source of income by sending the fresh fruit to a nearby market, or by canning, preserving, or making it into jelly. There is magic in the words "Home Made" placed on a label.

The home fruit preserving industry was at its height when it was a serious necessity: from pioneer, or colonial times until about the beginning of the last quarter of the nineteenth century. In those days no home store-room was considered well stocked without its rows of canned and preserved fruits, all carefully labelled, and its scores of glasse of jelly.

During the last quarter of the nienteenth century the decline of this very important home occupation was very rapid, owing:

First. To the great development of the modern commercial spirit in preparing on an expensive scale, and in marketing cheaply, all articles that mankind might need.

Second. To increased facilities for the transportation of fruits, preserved or fresh, especially western and tropical fruits. Ofttimes one could buy canned western peaches much more cheaply than one could buy the materials at home, besides having all the labor of canning to perform.

Third. Increased facilities for the storage of fruits, placing *fresh fruits* in most of the larger markets at all times of the year.

Fourth. The destruction of most of the home fruit trees by the San José Scale, during the '90's and more recently.

Fifth. The complexity of our modern social life—bridge-whist, afternoon teas, balls, dinners, embroidery, novels, etc., quite unknown in days of old, have crowded out the more homely duties of the good old grandmother days.

Fortunately, we note a decided tendency toward the increased production of home preserved fruits. This is due to numerous causes, among which may be mentioned,

First. The serious adulteration of commercially prepared fruits.

Second. The very rigid State and National Pure Food Laws, which require all goods to be properly labeled, thus driving from the markets much inferior, adulterated and undesirable material.

Third. Increased demand for *home-made* foods, due largely to the campaign of Dr. Wiley, Chemist of the United States Department of Agriculture at Washington, showing the deleterious results of consuming adulterated or chemically preserved foods.

Fourth. Higher prices are paid for the home products, now that the adulterated foods are driven out of the market. To illustrate our point, we may pause long enough to say that a few years ago there was an extensive apple jelly factory just across the river from Harrisburg, Pa., and the chief incoming shipments which it received consisted of *turnips* by the wagon-loads and car-loads. No wonder the industrious and honest housewife, in making and attempting to sell her *pure apple jelly* could not compete in price with the factory's product.

Fifth.. The successful control of the San José Scale. This has been accomplished only within the last five years.

Sixth.—The city exodus to small farms, and the enthusiasm of the newly apprenticed farmer's wife in trying her own skill.

Seventh. The recent agricutltural and horticultural awakening in our own country, showing that there is real art, science and brains needed, rather than mere routine drudgery. Among these factors are are agricultural and horticultural societies, granges, farmers' clubs, farmers' institutes, State and National bulletins, State experiment stations, and, perhaps, above all, the State agricultural colleges, with their universal cry of "back to the soil" with "practical science."

The history of the rise and fall of the home preservation of fruits, and, later, of the tendency to again increase in our own country, closely follows that of the Old Country. In England to-day there is a decided tendency toward the revival of this very important home industry.

Vicar W. Wilks, the Honorable Secretary of the Royal Horticultural Society of England, and Vicar of Shirley, last June wrote as follows, in the "Introduction" to "The Book of Fruit Bottling," by Edith Bradley and May Cooke (John Lane Company, New York, Publishers): "Well, I have seen the art (of the home preservation of fruits) as practiced in our country die out amongst us—the lowest depths being reached about 1885, when I doubt whether there were a dozen ladies in the land who did their own bottling and preserving. Of late years that has revived somewhat, owing chiefly, I think, to the influence of the Royal Horticultural Society among public bodies."

Fruits are ordinarily preserved, or kept for home use in four ways: First, by canning; second, by preserving; third, by making into jams and jellies, and fourth, by drying.

In the preservation of foods by canning, preserving, etc., the most essential processes are the thorough sterilization of the food, and all

the utensils, and sealing the sterilized food to exclude all air that might contain germs to re-infect it.

A few words concerning methods may be helpful. In preserving, canning or jelly-making, iron or tin utensils should *never* be used. Use only porcelain-lined, enameled, brass, copper or aluminum cooking utensils. For paring fruits a silver or plated knife should be used, to avoid the discoloration of the fruit. It is well to remember that results are more satisfactory if fruit be heated to the boiling point gradually, and then cooked the required time.

The selection of fruit is one of the first steps in obtaining successful results. Fruit is at its best for all purposes, just before it is perfectly ripe. All soft fruits ferment very rapidly if over-ripe. Most fruits should be freshly picked, and all should be kept dry. In selecting small-seeded fruits it is not wise to select those which have a large proportion of seeds to pulp, unless the seeds be removed by straining or otherwise.

In preparing apples, quinces or pears, the fruit, after peeling and coring, should be dropped at once into cold water, to which a few drops of lemon juice have been added, to keep the fruit white. Use the juice of one lemon in two quarts of water, or add salt to cold water, an ounce of salt in a gallon of water.

If berries must be mashed, it is best to put a small quantity at a time in a colander, pour over them cold water, then put it on a sieve to drain, but it is better to keep them clean and dry from the time of picking.

The easiest and quickest way to peel peaches is to fill a wire frying basket with the fruit, plunge it into boiling water for three minutes, then remove and plunge for a moment into cold water, when the skins will slip off easily. Plums and tomatoes may be prepared in the same way.

MAKING SYRUP.

Syrups are of two degrees, heavy and light, according to the proportion of sugar and water used. The following table will give fairly accurately the percentage of sugar when the syrup has been boiling one minute, also which density is best for the various kinds of fruit:

1 pint of sugar, 1 gill water, = 40 degrees density, for preserved strawberries and cherries.

1 pint of sugar, ½ pint water, . .
1 pint sugar, 3 gills water, ... } Peaches, plums, quinces, currants.

1 pint sugar, 1 pint water—use for all canned acid fruits, such as early plums and sour cherries.

1 pint sugar, 1½ pints water, . .
1 pint sugar, 2 pints water, ... } Light syrup for canned pears, peaches, sweet plums, sweet cherries raspberries, blueberries and blackberries.

A syrup gauge is a graduated glass tube, which registers from 0° to 50°, and is employed to determine the quantity of sugar in the syrup.

In making syrups, the sugar should be dissolved in the water before it is heated. Heat slowly and boil gently without stirring; if rich syrups are boiled hard or jarred, there is danger of crystallization. Syrups may be made a day in advance of the regular canning.

CANNING FRUITS.

Most fruits should be canned rather than preserved. Everything must be carefully sterilized, and rubber rings should be renewed each year. Use the best jars obtainable. Keep abreast of the times, and watch for anything new that may come upon the market. The perfect jar has not yet appeared, but the Schram jar, made in St. Louis, is the most satisractory jar found as yet by the writer. Wide-mouthed jars for large fruits, canned whole, permit better show. A very successful way to can strawberries, cherries, or any of the thin-skinned fruits is as follows: Have jars hot; pack closely with the uncooked fruit; fill with boiling syrup (one pint sugar to one gill water); seal. Have ready a wash-boiler of boiling water. Place jars in this, tops down, having the jars completely submerged. Put the boiler away in any convenient and safe place until the water is cold. Fruit canned in this way retains its color and *shape* beautifully. Personally, for additional safety, I nearly always dip the tops of cans into melted paraffine, deep enough to come below the rubbers, after the cans are cold.

Fruit may be canned by simply stewing the fruit, placing it while boiling hot in the hot, sterilized jars; run the blade of a sterilized silver knife around, inside of the jar, that the fruit may be packed more solidly. Wipe the rim of the jar, dip the rubber ring into boiling water, place smoothly on the jar and seal. The work of filling must be done rapidly; each jar must be sealed as soon as filled, and the jars must be placed on a board out of a draft of cold air. If screw tops are used, they must be tightened after cooling.

CANNING IN THE OVEN.

This is an excellent method, all danger from scorching or burning being avoided. Cover the bottom of the oven with a sheet of asbestos, or place the fruit in shallow pans containing about two inches of boiling water. Sterilize; prepare fruit and syrup as previously directed. Fill the hot jars with fruit and syrup and place in the moderately hot oven. Cook ten minutes (a little longer for pears and quinces), remove from the oven; fill to overflowing with hot syrup and seal. Large fruits require about one pint syrup to each quart jar; small fruits about half a pint of syrup.

CANNED FRUIT IN WATER BATH.

Prepare fruit and syrup as for cooking in oven. Fill the sterilized jars and put on covers loosely. Place a wooden rack on bottom of boiler. Put in enough warm water to come about four inches above the rack. Place the jars in boiler, and be careful not to let them touch each other. Cover boiler and cook for ten minutes. Draw back on the stove, and when the steam passes off, remove each can to a pan of hot water; fill with boiling syrup and seal. (I have varied this method by putting covers on tightly, filling the boiler full enough so that the water covers up just to the rubber ring. This does away with exposing the contents to the air even for one moment, after cooking.)

Rhubarb may be canned by cold process in this way: cut rhubarb when young and tender; wash thoroughly and pare; cut in pieces about two inches long. Pack in sterilized jars; fill to overflowing with cold

water and let stand ten minutes; drain and fill again; seal with sterilized rings and covers. Gooseberries may be canned in the same manner.

PRESERVING FRUITS.

Some fruits are good only when preserved. Strawberries, sour cherries, sour plums and quinces belong to this class. In preserving, if one wishes to keep the preserve in jars or glasses, equal weights of sugar and fruit should be used.

For strawberries, currants, cherries, etc., use equal weights of fruit and sugar. Place a layer of fruit, then a layer of sugar in a kettle to a depth of about four inches. Heat slowly to draw out the juice; when it begins to boil, skim and boil for ten minutes. Pour the cooked fruit into platters, having it about two inches deep; place in a sunny window for four days. The fruit will grow plump and firm, and the syrup will thicken into jelly.

Also preserve by immersing the fruit in honey.

JELLY MAKING.

It has been demonstrated that when sugar is dissolved and heated in fruit juice, if the syrup gauge registers 25°, the proportion of sugar is exactly right for combining with the pectin bodies to make jelly. If the gauge register more than 25° add more juice; if less, add more sugar.

One source of trouble in jelly making is too rapid boiling. Another source is an incorrect proportion of sugar. It is not generally known, perhaps, that fruit ripened in a hot season with plenty of sunshine, contains a greater proportion of sugar, than that ripened in cold, damp weather, hence one may use one pint of sugar to one of fruit juice one season, and the next year use one pint of the same kind of juice to three-quarters of a pint of sugar. A syrup gauge is invaluable here, for if it registers 25° your jelly will be just right. The general method of making jelly is too well known to take time to describe here. The jelly should be placed in the sun to "set," and then covered with a disc of paper dipped in paraffine.

Currant jelly may be made by the cold process, and is more delicate than when boiled, but does not keep as well. To make: measure the juice, and take for every pint of juice one pint granulated sugar. Dissolve thoroughly the sugar in the juice. Fill hot, sterilized glasses with this, and place the glasses on a board in a sunny window. Cover the glasses with glass, and leave in the sunny window until set.

Many persons use parings and cores of fruit in jelly making. I am not sure that this is always wise or economical.

FRUIT JUICES.

Sweet grape juice is particularly good as a drink. The juice should be pressed from the grapes, sterilized, and placed in sterilized bottles, using one gill water to one quart juice. Raspberry, blackberry, strawberry and currant juices are made in the same way, using half a pint of sugar to a quart of juice, and in currants a pint of sugar to a quart of juice.

Cider.—To make good cider it is necessary to have the best kinds of good fruit, and this is not always easy, because the culture of the cider apple has been neglected of late. Most delicious ciders may be made

from crab apples. In England, cider is made from a wild crab apple, which is too puckery and unpleasnt to use otherwise, but the juice is delicious and is often sold as champagne. It is not necessary to say that all refuse and dirt should be carefully guarded against in making cider.

Perry is the expressed juice of the pear, and is not often made in this country, pears being too expensive and rare.

CANNING VEGETABLES.

Lima beans and string beans should be slightly boiled, not cooked, in clear water, and this water poured off. One will find the water which is poured off quite green. Have the jars hot, pack as full as possible with the beans; fill to overflowing with boiling water and seal. Place in a wash boiler, fill with cold water up to the rubbers and boil for three hours. Take cans out and tighten tops. In some cases the rubbers will have pushed out in such a way as to render a new rubber necessary. If after cooking the liquid does not cover the beans, it is well to fill the can again with boiling water.

Corn is canned in exactly the same way, except that it is not boiled first, but jacked into jars cold. In using these vegetables, let cold water run over them in the can for a few moments before taking out. Tomatoes may be successfully canned in the same manner. (See sample.)

DRYING FRUITS.

In preparing a supply of fruit for winter use, every thrifty housewife prepares a quantity of dried fruits. Drying is much less expensive than canning or preserving, and many people prefer the flavor of a dried peach to that of the finest canned fruit. A hot bed frame with a bottom to it, and slightly raised from the ground, makes an excellent drying box. The sash should be elevated at one end to allow the moisture to run off, and the opening covered with netting. Fruit may be placed on plates and dried in the oven, but much care must be taken to prevent scorching. Numerous cook-stove dryers have been placed upon the market, some of which are very excellent.

The secret of keeping dried fruit is to *exclude the light,* and keep in a cool, dry place. It is said that dried fruit put away with a little sassafras bark will keep for years unmolested by insects. All fruit is better peeled before drying. Apples, bananas, blackberries, cherries, currants, gooseberries, green gages, peaches, pineapple, prunes, in fact almost all fruits may be dried in times of plenty, and stored for the time when the fruit crop fails.

The Maiden Blush apple is considered best for drying.

TABLE.

(*Varies with the state of maturity of the fruit or vegetable.*)

1 bushel apples gives 6½ pounds dried fruit.
1 bushel peaches gives 7 pounds dried fruit.
1 bushel of peaches, unpared, gives 9 to 10 pounds dried fruit.
1 bushel pears gives 6 to 8 pounds dried fruit.
1 bushel apricots, 8 pounds.
1 bushel of plums, pitted, 9 to 10 pounds.
100 quarts raspberries, 32 to 35 pounds.
100 quarts blackberries, 35 pounds.

100 quarts cherries (stoned), 25 pounds.
100 quarts of blueberries, 26 pounds.
100 pounds sweet corn, 26 pounds.
100 pounds pumpkin, 9 pounds.

SOME UNUSUAL RECIPES.

1. Cherry Salad: Use the large white cherries. Remove the pits, replace with filberts, and serve in a bed of lettuce leaves, covering the whole with mayonaise.

2. The juice of canned blackberries or cherry preserves, or the juice that is left from stewed prunes, may be cooked with stewed apples, or put into a rice or bread pudding, and will impart a delicious flavor.

3. Tomato Rarebit: ½ can tomatoes, ¼ of an onion, 3 cloves, 1-3 teaspoon mustard, ½ teaspoon salt, ¼ teaspoon soda. Cook ten minutes; add ½ teaspoon cornstarch and strain; add 6 ounces grated cheese, and when melted serve on toast or hot crackers.

4. Watermelon rind: Cut melon rind as for preserves, leaving the meat in large square pieces; boil one hour in water. Drain and boil again, with an equal weight of sugar until boiled down thick. Dry on plates, and use in cakes and mincemeat in place of citron.

5. Pear Salad: Serve on a lettuce leaf half of a canned pear, and cover with a boiled cream dressing and chopped nuts.

6. Carrot Preserve: Boil small, fine-grained carrots in water until tender. Peel and grate. Add sugar to taste, slips of citron, spices to taste, a little orange and lemon juice, half and half, simmer slowly and put away in jars. Very wholesome for children.

7. Rowan or Mountain-ash berries make excellent jelly, and are also valuable for sore throat. Pick berries when red, but not too ripe. Strip berries from stem, and put into a kettle. Add enough cold water to cover berries. Cook until soft, and strain through jelly bag. To every cup of juice add one cup granulated sugar and cook until it jellies.

Rhubarb or pie plant can be mixed with any kind of fruit, half and half, and in a short time will taste exactly like the fruit with which it is mixed.

RHUBARB PRESERVE.

5 pounds rhubarb, 5 pounds sugar, 1 pound raisins, 2 oranges, sliced, without peeling. Cook until thick, stirring almost constantly. This is very nice, and cooks very rapidly.

In closing, I would suggest for our own region, the following varieties of fruits as especially adapted to various uses:

Apples, for drying, Maiden Blush, because white.

Pears, for canning, Bartlett and Duchess. The Duchess and Keifer pears are very much improved by canning.

Plums, to can, Damson.

Cherries, to can, the Ida, originated by Mr. Eli Cocklin, at Bowmansdale; also the Cumberland.

Currants, to can and dry, Black.

Currants, for jelly, red, or white, when ripe.

Preserving, in any form, is to be recommended as an economical method of disposing of second grade fruits. Any one who can produce fruits of first or fancy grade, can sell them. The great problem

of our producers will be to make profits on their second grades. For this we recommend commercial home canning or preserving, or the establishment of local canneries, perhaps on the co-operative plan.

THE PRESIDENT.—Next on the program is "Some Spraying Experiments," by J. E. Heine, Orwigsburg, Pa.

SOME SPRAYING EXPERIMENTS.

J. E. HEINE, Orwigsburg, Pa.

Mr. President: I don't know whether I am qualified to speak on this subject or not. I am not an expert. Some claim I am a fruit grower, and I would like to be, but only grow it on a small scale. That is the reason I am here, and as I look over the faces of this audience, I am not sure that I am even a fruit grower. I have about fifteen hundred trees. I would have planted more, but for lack of funds. Most of these trees have been planted within the last four or five years.

The most important point I would like to take up with you this afternoon is the matter of scale. Not being well supplied with funds, the scale question is a very important one to me. Just at the time I thought the lime and sulphur wash was the standard remedy for the scale, Mr. Atkinson comes out in his November number of the Farm Journal, with very discouraging news. I wrote to him for further information, and he gave me information that was still more discouraging. He believes that lime and sulphur is injurious to fruit trees. Then I wrote letters to a number of New York fruit growers, requesting their replies. Most of them recommended lime and sulphur. Some of them recommended the oils. Now, it appears to me, so far, that oil is too expensive, and it is not a fungicide, while the lime and sulphur is, in a certain measure, and it is still more dangerous to handle. I hardly know what to do. I have not used lime and sulphur since Mr. Atkinson says it is injurious to the tree, as he certainly ought to know what he is talking about. Five years ago I was in his orchard, and saw his trees, and he certainly had fine trees and fine fruit. This year he claims he has very little fruit, and he has Italians at work in his orchard with grubbing hoes, digging up the trees, because they have been ruined.

Now, I would like to have those of you who have had considerable experience in spraying, to help me out on this question, as to what is really the best and cheapest remedy for the San José Scale. I believe we are getting to the point where we will have to have a cheaper remedy than these present oils. So far I have been able to control the scale with lime and sulphur, wherever I have sprayed. Of course, where I have not sprayed thoroughly, the scale continues.

Up in our section, most men know very little about the scale. We do not know the history of the San José or Oyster Shell Scale, or how to control them, and unless we find some remedy that will not injure the trees, we will have to discontinue fruit growing. If a man wants to raise fruit now-a-days, he must use some good scalecide, and pay more attention to the work, or do what our people up in Schuylkill county are doing—go out of the business.

It has been claimed that it is much cheaper to fight fungus by painting with whitelead and oil, than to fight it with copper sulphate. The

copper sulphate is better, but quite expensive if one wants to spray thoroughly. A good many people have too weak a pump. A weak pump cannot do proper work; I believe in having lots of pressure. A barrel pump is rather small for me, and I don't care much for them. There should be at least a hundred and thirty to a hundred fifty pounds pressure to throw the spray to any height. He should make two sprayings, one in the spring, and one in the fall, and spray the tree thoroughly on all sides. I have ,tried many different nozzles, and have come to the conclusion that the Grant nozzle is the best for my purpose that I have ever used. It is not a nozzle for a low pressure pump, but it responds easily to high pressure. It is much better than the Single Vermorel. I have also used the Double Vermorel. It controls the pressure easily.

I am not an orchardist, as I told you, and I would like to ask for an expression in the matter of the scale remedy from the orchardists here. If there are any suggestion, I should be glad to receive them. Tell me, gentlemen, what you are using.

A MEMBER.—Have you ever tried Scalecide?

MR. HEINE.—It appears to me that it is all right, but it is too high in price. We are paying fifty cents a gallon, and there is danger of killing the trees. Where it strikes, the tree is liable to rot. At least, that has been my experience.

At first I used to use salt with the lime and sulphur, but I don't do that any more.

THE PRESIDENT.—We will not have time to take up this discussion now. Dr. Surface is going to talk to us on this subject in a short time, and then we will have a general talk.

MR. HARTMAN.—As a matter of information, we have with us Mr. Briggs, who is familiar with the orchard of Mr. Atkinson, of the Farm Journal. I hope he will be granted a few minutes to tell us about it.

MR. BRIGGS.—This farm of Mr. Atkinson's happens to be in my neighborhood, and I know a great many of his neighbors. You will pardon me if I say too much.

His neighbors are making fund of fund of him for his treatment of his orchard. Two weeks ago I spent an hour in his orchard with a friend. It had not been sprayed in two years, his farmer told me, and it looked it, and it looked, too, as if it had not seen the pruning knife in that time, either, according to my ability to judge. I visited every tree in that orchard, and found some of them being cut down. The reason they gave us for this was that those trees were infested with the scale. I noticed a number of trees marked with a twine, and found they had been marked for cutting down. There was no one in the field, from whom I could get any information. The men at work were foreigners, who apparently did not understand English, and I made this visit with a neighbor. Going out, however, I met his farmer, and talked with him, and he gave me this information.

Standing in one position in that orchard, I counted twenty-eight trees in the prime of life (as to age), which should not have been cut

down, but which were marked to be cut down because of the scale. I took out my knife, and dug into the bark to see if those trees were ruined by the San José Scale, and I found they were.

Now, the condition of his orchard was as I have told you. His farmer told me that they had tried spraying, only one time with lime and sulphur, but it had not been done thoroughly, another time with oil, then with some of these commercial preparations, until the orchard was ruined, and then he blamed the lime and sulphur for it, when, as a matter of fact, he had not even given it a fair trial.

THE PRESIDENT.—We will now have the pleasure of listening to Prof. Surface.

HOME-MADE SOLUBLE OILS.

BY PROF. H. A. SURFACE, Economic Zoologist, Harrisburg, Pa.

Concerning this subject of Mr. Atkinson's orchard over near Ambler. I want to say that although he made the statement that the lime and sulphur wash had failed to control the scale, I have hundreds of letters from all over the State, saying that lime and sulphur is absolutely the best remedy to free trees from scale. After he made that statement, I went to see him about it, and he practically gave me a conference during most of the afternoon, and he finally said that he probably made his statement too strong; the men who were sent out to spray his orchard did not do the work properly; only one side of the tree was sprayed, and they really did not spray at all, only put a little of the mixture on the trees. He told me that while he considered that his orchard had not been saved by the one application of lime and sulphur wash, had he published what he knew of the use of commercial oils, it would have been five times worse, as his trees (especially pear) were at that time stunted and absolutely permanently ruined by the use of oils.

Now, I am to talk to you on the subject of "Home Made Soluble Oils," but I am in a position where I can yet scarcely speak positively on the subject from personal experience, and don't wish to mislead any one. There are two bulletins on this subject, one published in Delaware, and one in Connecticut. The Experiment Station at Storrs, Conn., published a bulletin on this, after experimenting in this direction, but what I am going to say to you is based on our experiments by one of my assistants, Mr. F. L. Hartzell, who has experimented with the making and use of this material, and on what I have learned by studying the subject.

So far as we know now, many of the so-called "soluble oils" put on the market under various high-sounding names can be made at home at less than one-half the cost you can buy them in any case offered, and there is less of the danger element. The danger with most of these commercial oils is that if they are strong enough to do the work of killing the San José Scale they are liable to damage the tree, and again, these oils are not fungicides. Then, again, there is the high price. Now, some of the chemists and entomologists of the different States decided to see whether they could not make a soluble oil that would be cheaper and better, and between them the following formula has been prepared.

You make first the emulsifier. Oil treated with this emulsifier has the advantage over the crude petroleum alone in that when we are going to use it we can dilute it with water to the amount we want to put on the tree. First, let me state to my correspondents that I am going to work this out myself, and publish it in my Bulletin, so they need not take only my present word for it; now, this is the emulsifier:

Carbolic acid (100 per cent.), 2 quarts.
Good fish oil, either whale or Menhaden, 2½ quarts.
Caustic potash, pure granulated 75 per cent., 1 pound.

Heat these in a covered kettle, in the open air, to 300 degrees Fahrenheit. That takes a very few minutes to do this—possibly fifteen minutes. Then we let it cool and add 3½ quarts of kerosene, and 5½ gallons of water. That is the Emulsifier. Instead of removing it from the fire, we can simply bank the fire to add the kerosene. It is not advisable to add it while over the blazing fire. Then we make the soluble oil; this is made as follows:

Emulsifier, 8 parts.
Crude oil, 4 parts (Warren sand oil will do).
Rosin oil, 4 parts.
Water, 1 part.

This costs from 16 to 18 cents a gallon, and in applying it you take one part to 16 gallons of water; so it makes the material cost you about one cent per gallon as it goes on the trees. This cost is figured in this way:

Carbolic acid, 52 cents.
Fish oil, 15 cents a gallon.
Caustic soda, 15 cents a pound.
Kerosene, 9 cents per gallon, by the barrel.
Resin oil, 30 cents a gallon.

This does not take as long to prepare as the lime and sulphur, but we must remember that it is not a fungicide, while the lime and sulphur is. There is no reason to suppose that this is injurious, as is the case with the majority of oils, and it has the advantage, in common with the lime and sulphur, of destroying the scale.

I have letters from hundreds and hundreds of people who have saved their trees by the use of lime and sulphur, and on the other hand, I have letters from others who have destroyed their orchards by the use of some of these commercial oils that are on the market. Take the case of one material that is on the market, called the "Target Brand Scale Destroyer." At present, it appears to have a good hold on the market, and yet I know of a case where a man had thirty-five hundred trees and killed four hundred of them by its use,—some of his very best trees, and I can name instances of other people who have lost their trees.

Now, as long as we continue to use such commercial preparations, and to encourage their manufacture, we cannot hope to get the results in our orchards that we want.

A MEMBER.—How about Scaleicide?

PROF. SURFACE.—That is some better.

MR. ROBERTS.—How about the Rex?

PROF. SURFACE.—That is excellent; it is largely lime and sulphur. Another not so long known, but the State Entomologist at Portland, Oregon, has prepared a paper on Niagara Spray, in which good results are reported. This is a lime-sulphur solution, made by the Niagara Spray Co., Middleport, N. Y., which needs only to be diluted with 8 or 10 times its bulk of cold water and sprayed.

MR. ROBERTS.—Is it not cheaper than anything else?

PROF. SURFACE.—Yes; there is nothing quite as cheap as the lime and sulphur, but if you prefer a commercial spray, the Rex will be all right, as will also the Niagara, and be cheaper than the oils.

A MEMBER.—Must it be heated?

PROF. SURFACE.—No, sir; you don't have to heat the lime and sulphur, to use it. We have kept it for three months and then applied it.

A MEMBER.—Will it work successfully through the nozzle?

PROF. SURFACE.—Yes, sir.

MR. ROBERTS.—The Target Brand is not so very high if you buy it in carload lots.

PROF. SURFACE.—Have you used it?

MR. ROBERTS.—Yes, sir.

PROF. SURFACE.—What results have you had?

MR. ROBERTS.—Excellent; we were given a barrel to try by the State Board of New Jersey, and we liked it so well, that we bought it in the fall.

PROF. SURFACE.—If I had a carload of Target Brand to sell I would give you first chance at it, but I, myself, would not use it unless I were ready to kill my trees. (It must be remembered Mr. R. is an agent for it.)

Now, Mr. President, may I take a few minutes to read a prepared paper on the subject of our Demonstration Orchards? My paper is very short and I shall soon be through.

THE PRESIDENT.—Certainly; we shall be glad to give you all the time you need.

DEMONSTRATION ORCHARDS.

The chief new feature of the work of the Economic Zoologist for the year 1908 is to be the establishment of a number of demonstration orchards in the State of Pennsylvania. The purpose of undertaking this work is to show in a practical way just how to control orchard pests, both insects and diseases, and to produce perfect fruit at the

lowest cost, by known and tested methods. Experiments are being conducted from our own office in the vicinity of Harrisburg and Mechanicsburg with new methods, or materials to obtain new results, and it is not advisable to attempt any real experiments in these demonstration orchards, but to show the public what can be done in a practical way. There is a great deal of difference between experiments and demonstrations. In the former the person undertakes work by some new method, with new apparatus, or with new materials, at a new or unusual time, etc., to learn what results may follow. The results are unknown at the time of performing the work, and may not prove beneficial in the end. However, where beneficial results are obtained they are of course new, and may often be very useful, but should be tried again before being placed before the public. The experiments which we have performed up to the present time have been of a wide range, including all kinds of insecticides and fungicides available, different kinds of apparatus, treatment of infested trees and plants by a great variety of means and at different times of the year. The results of these have been published from time to time in our bulletins and will continue to be so published in the future.

A demonstration is for the purpose of showing the public the methods of some work which is already known and understood by the demonstrator, and consequently the result of which can not be in doubt. Thus, the demonstration orchard work in this State is to be for the purpose of obtaining definite results which we now know must follow certain methods, and especially for the purpose of showthe public how the work is done to obtain these results. Therefore, the orchards must be so situated that they will be available to the greatest number of persons in a county or region, and should be of sufficient size to be suitable in fairly demonstrating horticultural methods, including pruning, spraying, thinning of fruit and possibly also cultivating and fertilizing, with special reference to the known modern methods of controlling insects and preventing plant disease. Everything that can be done to increase or promote the vigor of a tree is quite advisable as aids in helping to overcome the adverse effects of injuries by injurious diseases, insects, or other causes. Thus, the cultivation and fertilization of an orchard to promote proper growth are necessary parts of insecticidal practice, and pruning is so intimately connected with spraying that one can not do a proper spraying job without first properly pruning his trees. Also, if the trees be permitted to bear twice the amount of fruit they should, and weaken themselves, they are at once more susceptible to injury by diseases and insects, and consequently the thinning of fruit must receive its proper attention at the right time.

It is our present intention to accept in each of the fruit-growing counties of the State an orchard that is of easy access to the public, containing some bearing trees of different kinds, preferring apple, pear, peach, plum and others if possible, some of which should be of bearing age, although the others may be younger, but all should not be of the old style high-headed varieties, which it is almost impossible to treat properly by modern methods. We are willing to take a few such trees and show how to prune and spray them and give them proper treatment throughout the year, but we shall not assume the most difficult and in many cases impossible task of the horticulturist in attempting to renovate or restore an old worn-out orchard

of very tall, badly infested trees. In such cases it would be cheaper and much more advisable to remove the old trees and plant new ones.

We shall also demonstrate the planting and care of some young orchards from the preparation of the soil, the selection of varieties, setting and pruning the trees, and care in their later development as long as the demonstrations are continued.

It is our purpose to have charge of these demonstration orchards throughout the entire year and continue the demonstrations during next year and doubtless as long as legislative provision be made for this kind of work. The longer the demonstration orchard is continued as such the more profitable to the community it should become. In consideration of the fact that in many parts of the State this will be "off year" in apple production, it is not to be expected that a demonstration orchard can by any manipulation given it at present, be made to bear as much fruit at it did last year, which was the season for a full crop.However, we hope in these orchards to demonstrate means of aiding to reduce excessive production every other year and increase the fruit crop in alternate years, when locally it would be more valuable.

The details of the requirements of the orchardist or owner are not yet settled, but the probable offer from this office will be to furnish all spraying materials needed, and also apparatus if the owner does not have an outfit, and send an expert to assume intelligent control of the orchard methods and direct the work and assist with it. Our representative will render service in the orchard without charge to the owner further than his own board and lodging where he is not near a hotel, and the owner will be permitted to make such use of the fruit as he may desire after our superintendent has had opportunity to make notes and measurements of yield.

This is an opportunity to obtain intelligent guidance in modern methods of orchard culture without expense to the owner or community, and should result very beneficially in those regions where there is no expert orchardist immediately available for observation and consultation. Where there is an expert in orcharding, there is no need of establishing a demonstration orchard, for the reason that ours would probably not differ greatly from his, and he would no doubt be willing to permit persons to see his methods if they should so desire. In other words, we propose a campaign of education, and upon the principle that it is not necessary to teach rudiments to persons who are already educated, it may not be found most profitable to establish demonstration orchards at the premises of expert and successful fruit growers.

Inspectors will be sent to investigate conditions in orchards offered for this work, and will make a report to us concerning the availability of the orchard, number and kinds of trees, etc., there grown, their age and condition, and other data, that will help in arriving at a decision in making a selection of the orchard for demonstration purposes. After such selection is made notification will be given through these bulletins, the newspapers and by other means, and an especial effort will be made to invite the public to visit the orchards. The public should see the method of planting, pruning, spraying for scale, spraying for the codling moth, spraying for leaf diseases and diseases of fruits, thinning, picking and other work that will be an-

nounced later. It is to be hoped that many persons will be ready to avail themselves of this opportunity to receive direct practical instruction.

THE PRESIDENT.—If the Chairman is ready, we will now hear the report of the Committee on Resolutions.

WHEREAS, The next annual meeting of this Association will be the fiftieth, or semi-centennial, since its organization; therefore,

Resolved, That the Chair be authorized to appoint a committee of five, of which he shall be the chairman, to consider the propriety of preparing a program commemorative of the event, and with special reference to said occasion and to decide upon the scope and character of said program, and that said committee be authorized to take final action in the matter.

On motion, the resolution was adopted.

WHEREAS, Through the death of Prof. George C. Butz, the members of the Horticultural Association of Pennsylvania have lost a dear friend and a valued counsellor; and

WHEREAS, His accustomed presence and sympathetic counsel have been sorely missed from the sessions of our meeting be it

Resolved, That we express our deepest regret for this great loss, and sincere sympathy for the bereaved wife and family.

WHEREAS, We have learned of the death of the wife of Henry C. Snavely; be it

Resolved, That we extend our heartfelt sympathy to our friend in his bereavement.

WHEREAS, On account of the great variety of soil types in Pennsylvania and the extent to which we find culture has grown in this State, it is of the greatest importance that a study of these soil types be made, as to their adaptation to fruit culture; be it

Resolved, That the Chief of the Bureau of Soils, Prof. Milton Whitney, be requested, if possible, to assign Mr. H. J. Wilder to Pennsylvania and adjoining States for 1908.

Be it Resolved, That the Association vote its thanks to the county commissioners of Lancaster county for their kindness and courtesy in providing this pleasant room for the use of our meetings.

Be it Resolved, That the hearty and sincere appreciation be extended to the Committee of Arrangements who have done so much to make our stay in Lancaster an occasion long to be remembered.

Be it Resolved, That we heartily appreciate the co-operation of the press of the city, both before and during the sessions of our convenvention. On motion, the resolutions were adopted as read.

THE PRESIDENT.—Now, if you have any special remarks to make, we will take a few minutes for that purpose.

MR. FENSTERMAKER.—Now, just a suggestion: The exhibits are marked and judged according to grade, and there is no effort made to keep the different varieties separate. I think this should be done.

THE SECRETARY.—As I understand it, the speaker means that instead of the exhibitors having a number of plates here with the exhibitors' names attached, they should be separated under the different varieties of apples. Personally, I would be satisfied with this, but I am afraid that most of the exhibitors would be dissatisfied because they would lose their identity. It is all very well in an association like that of Adams or Snyder county, but I hardly think the rest of the exhibitors would be satisfied. That is my personal view of the matter. As I understand Mr. Fenstermaker, he wants the varieties graded, regardless of the exhibitor. Am I right?

MR. FENSTERMAKER.—Yes, sir.

DR. MAYER.—I don't think this would benefit us any, because it is not a competitive exhibition. If any one wants to enter into a competitive exhibition, there are opportunities elsewhere, and I think the Secretary is right about the exhibitors not caring to lose their identity. If the exhibitor desires to exhibit his fruit elsewhere, as is frequently the case, it is quite a job to separate each man's exhibit again. I don't think it would be a good thing to make any change.

MR. HARTMAN.—In going over the fruit to classify it according to the different exhibitors, we found quite a little difficulty in telling whose exhibit belonged to who, and while I agree with Mr. Engle and Dr. Mayer that it is more important to foster a good spirit among the members, rather than a competitive spirit, it would be, in one sense very desirable to be able to distinguish between the different varieties, as Mr. Fenstermaker suggests. Still, I think the sentiment of the Association is in favor of the individual exhibit, and I would suggest that if it is possible, without much extra expense, to get half a dozen different colors of cards, to write on the names, so that no two varieties of apples bear the same color, it would in some measure overcome this difficulty. In that way the variety of the apple could be told by its color, and it would help the judges very much. This way we often find individual exhibits scattered in different parts of the room, and it is a little difficult to keep track of them.

THE PRESIDENT.—It seems to me that one way to carry out Mr. Fenstermaker's idea would be to have an extra judge to judge our fruit according to grade.

MR. JAMISON.—When fruit is brought here it should be entered, and this entry copied into a pass book, and the pass book given to the commimttee. Now, here are two plates of Baldwins, belonging to this man, and farther down are two more of them. Now, at agricultural fairs, where articles are entered as I have suggested, they would know by looking at the list how many articles each man has, and consequently they would have no trouble in going over them and sorting them out. Here is where the trouble comes in. This is a very fine exhibit—I think the finest I have ever seen, but it should be entered as brought in, so as to give the committee as little trouble as possible.

THE PRESIDENT.—Any further remarks? Is this a motion, Mr. Fenstermaker, or only a suggestion.

MR. FENSTERMAKER.—Only a suggestion; that is all.

THE PRESIDENT.—Well, I think if we bear these suggestions in mind, we will be able to make a better arrangement next year. I believe that Mr. Jamison's suggestion about entering the exhibits as they do at county fairs, is a very good one.

Is there any further business? The hour is getting late, and we must get over the ground as rapidly as possible.

THE SECRETARY.—There is a communication here from the Mississippi Valley Apple Growers' Association in regard to adopting the apple blossom as our national flower. The same thing was presented last year, but not acted upon, and I wish something definite would be done, because it likely will not down until acted upon.

THE PRESIDENT.—Suppose you read it, and then we can see what action will be taken.

The Secretary then read the following communication:

OFFICE OF THE MISSISSIPPI VALLEY APPLE GROWERS' ASSOCIATION,

QUINCY, ILL., Jan. 11, 1908.

To the Officers and Members of the Pennsylvania State Horticultural Association:

Gentlemen—A sincere interest in your annual gathering and a genuine interest in everything that promotes horticulture in all its departments, influences me to extend heartiest greetings and the best wishes for a most harmonious and eminently successful meeting.

I also beg to submit a matter which I hope will receive respectful attention and the most favorable consideration. Following a meeting of the American Apple Growers' Congress, held in St. Louis, in August, 1907, a suggestion was made elect the apple blossom as our national flower. As you well know, we have no national floral emblem, and the importance of the apple industry in America cannot be overestimated.

It is quite patent that the apple growers need to be more thoroughly aroused as to the value of their opportunities, and many are seeking for information that will lead to more intelligent application all along the line of their chosen vocations. It is believed that such ends can be reached by holding up the value of our great American fruit and by giving it a proper place in the prominence it justly deserves.

It has not been much more than a year since the proposition of choosing the apple blossom for our national floral emblem was placed before different National and State and distinct horticultural societies, and the vote in its favor has not only been practically unanimous, but an admirable enthusiasm has been aroused, giving the most desirable shape and form to the movement.

Among the last States voting in favor of the proposition are the State of Missouri, which has a larger acreage of orchards than any other State in the Union, and the State of Maine, which has been noted for its success in growing finely-flavored fruit. Numerous other states approved of the measure at their last meetings, and there is an unbounded assurance that Oregon will give a great force to the move-

ment at the annual meeting of the Horticultural Society in Portland this week.

The apple blossom stands for something. There is nothing like a sickly sentiment associated with the favorite flower. When the bloom silently opens in the spring, millions of eyes are turned towards it, and millions of minds commence calculations on far-reaching results in the widest commercial circles.

Forests are inspected for supplies of timber for barrels and boxes, thousands of stave and box factories get ready for work; life and vigor are given to various manufactures which supply all kinds of orchard cultivators, implements, sprayers and spraying mixtures; railroads, warehouses, cold storage plants and a countless army of toilers get busy for their parts in the service, and ocean-going steamers commence anticipating cargoes for foreign shores.

In a brief paper, it is not possible to even hint at a thousand directions that are affected by the apple industry. It is the only fruit that we export, and the only fruit that we can keep in good condition from one year to another.

It is, therefore, to be hoped that you will join with numerous other kindred organizations in going on record that you favor the choice of the apple blossom for our national flower by adopting a fitting resolution.

I wish to again express my best wishes for your Society collectively, and members individually. Yours respectfully,

JAMES HANDLY,
Secretary.

THE PRESIDENT.—What is the pleasure of the Society in regard to this matter?

MR. HARTMAN.—I merely wish to express an opinion, not to make a motion in regard to that letter. We all have our sentiments in one shape or another, and while I think the apple blossom would be as proper a national flower as anything we have, it is very incongruous for the apple interests to set it up as the national flower, and then back it up by such a set of final reasons as given in that letter. I would not be in favor of it.

A MEMBER.—I move that the paper be laid on the table.
This motion was duly seconded and carried.

THE PRESIDENT.—Any further business?

MR. JAMISON.—It has been customary heretofore for an obituary committee to be appointed. I don't know that there has been any actual member deceased during this past year, but I know of one who was formerly a member, and who has done a great deal in the interest of horticultural work. In connection with his brother, he has done a great deal for the furtherance of the peach interest in Juniata county. I refer to Mr. J. H. Smith, of Swales, Pa.

THE PRESIDENT.—Do you wish to offer a resolution?

MR. JAMISON.—I have no resolution prepared, but I think it

would be proper. His brother, Mr. J. T. Smith, is still alive. You probably know of the Smith Brothers, and if you were ever up there from '88 to '96, in the peach season, you would see at the stations many crates of peaches bearing their name. They sent out a good many carloads each season.

THE PRESIDENT.—I think that the only really active member who has passed away during this past year was Prof. Butz, and we took action on that through the report of the Committee on Resolutions. I hardly think it would be in order for the Association to take formal action on the death of one who was not a member.

A MEMBER.—I move that the Secretary take note of the remarks of Mr. Jamison, and have a copy forwarded to this brother.

This motion was duly seconded and carried.

THE PRESIDENT.—Any further business? If not, a motion to adjourn would be in order.

Adjourned.

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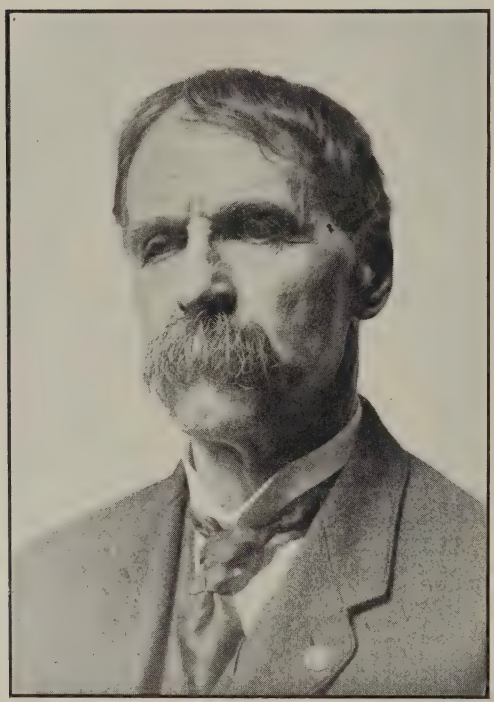

ENOS B. ENGLE

Who has served this Association as Secretary for thirty-five years, has this year asked to be relieved from the duties and cares of the office. While no longer an officer, Mr. Engle's heart is in horticultural work, and the Association is promised his continued presence and encouragement. (See report of Committee on Resolutions.)

The incoming Secretary, under whose care this book is published, feels that the above is due Mr. Engle and is assured that his many friends will be glad of this opportunity to keep his likeness before them.

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STATE HORTICULTURAL ASSOCIATION OF PENNSYLVANIA

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Huff, Burrell R., Greensburg, Westmoreland Co.
Landis, Israel, Lancaster, Lancaster Co.
McCormick, Harry, Harrisburg, Dauphin Co. (deceased).
McCormick, James, Harrisburg, Dauphin Co.
McLanahan, J. King, Hollidaysburg, Blair Co.
Martin, J. O., Mercersburg, Franklin Co.
Meehan, S. Mendelson, Germantown, Philadelphia, Pa.
Mitchell, Ehrman B., Harrisburg.
Pannebaker, Wm. M., Virgilina, Va.
Reist, Peter S., Lititz, Lancaster Co. (deceased).
Reist, John G., Mt. Joy, Lancaster Co.

Scribner, Prof. F. Lamson, Knoxville, Tenn.
Shaffner, Jacob, Harrisburg, Dauphin Co.
Snavely, H. H., Willow Street, Lancaster Co.
Swift, Rev. E. P., Mt. Oliver, Allegheny Co. (deceased).
Thomas, George B., West Chester, Chester Co.
Thomas, Edwin W., King of Prussia, Montgomery Co.
Van Deman, H. E., 3630 13th St., N. W., Washington, D. C.
Wertz, D. Maurice, Waynesboro, Franklin, Co.
Woods, Edward A., Frick Building, Pittsburg.

HONORARY MEMBERS.

Barry, P., Rochester, N. Y. (deceased).
Downing, Charles, Newburgh, N. Y. (deceased).
Ellwanger, George, Rochester, N. Y. (deceased).
Edge, Thomas J., Harrisburg.
Garber, J. B., Columbia, Pa. (deceased).
Heiges, Prof. S. B., Saxe, Va.
Meehan, Thomas, Germantown, Pa. (deceased).
Michener, Dr. E., Toughkenamon, Pa. (deceased).
Parsons, Prof. S. B., Flushing, N. Y.
Parry, William, Parry, N. J. (deceased).
Rathvon, Prof. S. S., Lancaster, Pa. (deceased).
Rowe, Hon. D. Watson, Chambersburg, Pa.
Rutter, John, West Chester, Pa. (deceased).
Saunders, Wm., Washington, D. C. (deceased).
Stitzel, George D., Reading, Pa. (deceased).
Thomas, John J., Union Springs, N. Y. (deceased).
Warder, Dr. John A., North Bend, O. (deceased).
Wilder, Marshall P., Boston, Mass. (deceased).
Wickershaw, Dr. J. P., Lancaster, Pa. (deceased).
Willetts, Rev. Dr., Philadelphia (deceased).

ANNUAL MEMBERS FOR 1909.

Adams, W. S., Aspers.
Anwyll, H. L., 114 Herr St., Harrisburg.
Armsby, Dr. H. P., State College.
Asper, D. C., Aspers.
Atwater, Richard M., Chadd's Ford.
Baird, A. T., Island.
Banks, Wm., Mifflintown.
Barlow, Thos. W., Fort Washington.
Barnard, C. P., Northbrook.
Bergey, James, Mifflintown.
Berkey, Edwin A., R. D. No. 3, Easton.
Bolton, W. P., McCall's Ferry.
Boyd, J. C., Guy's Mills.
Bracken, J. W., Hollidaysburg.
Brinton, Sam'l L., West Chester.
Brooke, R. G., Schwenkville.
Bucher, Dr. I. Riley, Lebanon.
Carter, Jno. I., Chatham.
Christman, Jas. M., Fort Hunter.
Cocklin, E. H., Siddonsburg.
Coursen, I. H., Wyoming.
Critchfield, Hon. N. B., Harrisburg.
Cumbler, H. B., Logania.
Cummings, R. M., Montandon.
Demming, H. C., Harrisburg.
Deming Co., Salem, Ohio.
Denlinger, Amos B., R. D. No. 1, Gordonville.
Duncan, P. F., Duncannon.
Durell, Chas. A., Reading.
Ebersole, Sam'l W., Hummelstown.
Eichholz, Henry, Waynesboro.
Eldon, Robert M., Aspers.
Ellis, D. M., Bridgeport.
Engle, Ezra B., Marietta.
Fassett, F. H., Meshoppen.
Fenstermaker, P. S., Allentown.
Fertig, Fred. R., Lebanon.
Foster, T. C., Winfield.
Frame, N. T., Martinsburg W. Va.
Gass, W. J., Paxinos.
Good, Martin R., Narvon.
Griest, C. A., Guernsey.
Gross, Joshua W., Harrisburg.
Grove, W. E., York Springs.
Gump, Dr. S. H., Bedford.
Haines, A. S., Westtown.
Haines, Mary M., Cheltenham.
Harper, Wm. Warner, Chestnut Hill, Philadelphia.
Harris, Joseph, Shamokin.
Harshman, U. W., Waynesboro.
Hartley, A. D., R. D. No. 3, Pottstown.
Hartman, L. E., Etters.
Herr, Daniel D., Lancaster.
Herr, David S., R. D. No. 7, Lancaster.
Herr, Jno. D., Lancaster.
Hertzog, P. H., Lewisburg.
Hess, Chas. C., Phillipsburg.
Hibshman, Geo., Ephrata.
Hostetler, Abram, R. D. No. 3, Johnstown.
Howe, H. B., Wellsboro.
Hull, D. W., Waymart.
Hunt, Dr. Thos. F., State College.
Ide, Silas C., R. D. No. 1, Alderson.
Jamison, J. E., Swales.
Kauffman, E. F., R. D. No. 3, York.
Kerr, W. M., 608 Bourse, Philadelphia.
Knuppenberg, D. A., Lake Carey.
Kready, W. S., Mount Joy.
Krewson, Jas., Cheltenham.
Laub, H. H., Jr., Lewistown.
Lee, Ross F., Bedford.
Lewis, W. J., R. D. No. 1, Pittston.
Leyder, J. S., Thompsontown.
Loop, A. I., North East.
Longsdorf, C. L., Biglerville.
Lockwood, H. C., Mt. Pocono.
McGowan, H. G., Geiger's Mills.

McSparran, W. F. Furniss.
MacKall, R. C., Beaver.
Macneil, W. H., Parkesburg.
MacVeagh, W. F., Williamsport.
Maffet, Miss M. A., 264 S. Franklin St., Wilkes-Barre.
Martin, Hon. A. L., Harrisburg.
Mayer, Dr. I. H., Willow Street.
Middleton, T. Elliott, Boiling Springs.
Miller, Norman G., Marion.
Moburg, F. O., Rochester, N. Y.
Moon, Sam'l C., Morrisville.
Moon, Wm. H., Morrisville.
Meyers, C. E., State College.
Myers, Levi M., Siddonsburg.
Nesbit, J. W., Oakdale.
Newcomer, Aaron, Midvale.
Newcomer, D. S., Hummelstown.
Nissley, S. K., 14 E. Chestnut St., Lancaster.
Patterson, Jas. A., Stewartstown.
Persing, E. E., Sunbury.
Pratt, B. G., 50 Church St., New York City.
Prickett, Josiah W., Biglerville.
Rakestraw, Thomas, Kennett Square.
Reel, Geo. L., Columbia.
Reinhart, S. B., Mercersburg.
Richardson, F. W., Paoli.
Rick, John, Reading.
Rinehart, Geo. W., R. D. No. 4, York.
Rife, Jacob L., Camp Hill.
Rittenhouse, Dr. J. S., Lorane.
Root, A. W., Manheim.
Root, J. W., Manheim.
Ruof, Fred., Hummelstown.
Rupp, D. C., Shiremanstown.
Rush, Jno. G., West Willow.
Satterthwait, A. F., 334 Spring St., Middletown.
Saylor, J. C., Pottstown.
Schaeffer, Dr. N. C., Lancaster.
Scholl, Calvin P., R. D., No. 1, Halifax.
Shalcross, Frank R., Frankford, Phila.
Siegler, Franklin, 320 S. 44th St., Philadelphia.
Snavely, H. C., Cleona.
Snavely, J. R., Harrisburg.
Snyder, Geo. S., R. D., No. 2, Millersburg.
Stein, Geo. E., East Prospect.
Stephens, A. W., Lewisburg.
Stewart, Prof. Jno P., State College.
Stewart, William, Landisburg.
Stoney, R. J., Jr., 424 5th Ave., Pittsburg.
Stover, F. S., Bowmansville.
Strode, A. Darlington, West Chester.
Strong, Rob't J., Shiremanstown.
Surface, Prof. H. A., Harrisburg.
Trimmer, G. A., Mechanicsburg.
Tyson, Edwin C., Flora Dale.
Tyson, Chester J., Flora Dale.
Tyson, William C., Guernsey.
Valentine, C. R., Skinner's Eddy.
Wadhams, Miss L. F., Wilkes-Barre.
Wagner, Geo. A., R. D., Landisburg.
Wallings, Don, West Chester.
Watlon, Rob't J., Hummelstown.
Watts, Prof. R. L., State College.
Weidner, A. I., Arendtsville.
Weise, H. B., Parkesburg.
Wertz, Geo. M., Johnstown.
Wheaton, E. H., Knoxville.
White, A. R., Duncannon.
Wilbur, Harry, Bethlehem.
Widler, Henry J., Dept. of Agriculture, Washington, D. C.
Withrow, J. C., Vanport.
Winner, W. G., Calvert.
Wright, A. Cooper, Hummelstown.
Yentzer, J. R., Conestoga.
Youngs, L. G., North East.
Zercher, Andrew J., Conestoga.
Zinn, W. H., Dauphin.

PROCEEDINGS

OF THE

FIFTIETH ANNUAL MEETING

OF THE

State Horticultural Association

of Pennsylvania,

HELD AT

Harrisburg, Pa., January 19-20, 1909

The Fiftieth Annual Meeting of the State Horticultural Association convened in the Board of Trade Building at Harrisburg, at two o'clock Tuesday afternoon, January 19, 1909, with the President, Mr. Gabriel Hiester, in the Chair.

The President.—The meeting will please come to order. The first thing on the program is the reading of the minutes of the last meeting. Will the Secretary please read the minutes?

The Secretary read the minutes of the last meeting, and they were approved.

The President.—The next number on the program is roll-call and collection of dues. If there is no objection, I would say that the members shall call on the Treasurer just after the close of this session and pay their dues. He will be here when we adjourn.

Nominations for members of the committee who shall nominate the officers for the coming year are now in order. I will appoint the committee that you nominate.

The meeting nominates: Dr. I. H. Mayer, Mr. Chester J. Tyson, Mr. J. D. Herr, Mr. P. S. Fenstermaker, Mr. J. Hibberd Bartram, Mr. H. C. Snavely and Prof. H. A. Surface.

The President.—I will appoint these gentlemen as a committee to nominate officers for the election to-morrow morning. Reports of officers are next in order. Is the Treasurer ready to report?

The Treasurer, M. Edwin W. Thomas, thereupon read the following report:

Treasurer's Report.

Edwin W. Thomas, Treasurer, to the State Horticultural Association of Pennsylvania, Dr.:

Receipts.

Cash balance January 15, 1908, ...	$95 10	
Annual dues for 1908, collected at Lancaster,	100 00	
Annual dues for 1908, received since, ...	13 00	
Annual dues for 1909, received in advance, .	4 00	
Donation, ...	150 00	
Total receipts, ...		$362 10

Credit by Amount Paid Out.

To Howard Paules, janitor service, ...	$6 00	
To John W. Backett, elevator, ...	1 00	
To J. D. Herr, sundries, ...	1 78	
To "The Wheatland," account hotel bills, ...	10 00	
To Chester J. Tyson, Gen'l Fruit Comm., ..	44 50	
To M. E. Rodrock, stenographic services, ...	50 00	
To Enos B. Engel, Secretary's salary and sunrdies, ...	91 57	
To Publishing House United Evangelical Church, ...	83 42	
Total expenditures, ...	288 27	
By balance, cash on hand, ...	73 83	
		$362 10

The President.—As an auditing committee, I will appoint Mr. W. C. Tyson, Mr. D. C. Rupp, and Mr. J. L. Rife.

The report of the General Fruit Committee is next in order. Is Mr. Tyson ready to report?

Mr. Tyson then read the following report:

Report of the General Fruit Committee for 1908.

CHESTER J. TYSON, *Chairman.*

In presenting this report for the season of 1908, the Chairman extends his thanks to the correspondents who have made prompt and satisfactory reply to the many inquiries. Blanks were mailed to several persons in each of the sixty-seven counties of the State. Responses have come from forty-seven of them, Butler, Clinton, Cumberland, Elk, Fayette, Forest, Fulton, Huntingdon, Indiana, Jefferson, Juniata, Lycoming, McKean, Montour, Philadelphia, Potter, Snyder, Susquehanna, Tioga and Venango, being silent this year. If any person from any of these counties, hearing or reading

this report, is willing to help with the work next year or knows of someone else who is competent, the Chairman will appreciate his sending in the names and addresses.

The season of 1908 has not been a very favorable one from a horticultural point of view. With the exception of a few favored spots, nearly all sections of the State report a cold, wet time of bloom, with the extreme condition of freezing and snow in some places. This was followed by drouth extending, with but slight rain, over two, three and even four months. This influenced the setting and subsequent growth of many fruits and with their proper and seasonable spraying, being offset in part, to be sure, by dry clear weather at picking time.

Apples.

The year 1908 seems to have been decidedly an off year for apples in Pennsylvania, only five persons out of a hundred reporting a good crop and these so scattered as to indicate local and not in any sense county or sectional conditions. A few reported a fair crop, especially in the northern counties. A slightly greater number reported good quality but even in this particular a majority of the reports showed poor quality and accounted for it by bad weather at spraying time and the subsequent dry season.

Pennsylvania has a long list of very good summer apples. Red Astrachan is the most favored by our correspondents, some persons, however, have found it a poor bearer. Yellow Transparent comes next with votes from all sections of the State, followed closely by Early Harvest. Others favored are Sweet Bough, Golden Sweet and Summer Strawberry. The chairman would add Early Ripe as an excellent and very useful cooking apple.

Next comes a list of the late summer and early fall varieties; Maiden Blush having the greatest number of votes, then Duchess for the north and Summer Rambo for the south, then Gravenstine, Wealthy and Porter.

Smokehouse is the great favorite of the later autumn kinds, followed by Fall Pippin and Twenty-Ounce. Baldwin is named as a fall apple in the southern counties.

Every home with sufficient ground should have at least one or two trees for each of these seasons and many persons have found the growing of summer and fall apples very profitable. If asked to make a list for a home orchard, of twelve trees to cover these seasons, we should probably name as follows: one Yellow Transparent, one Early Harvest, one Red Astrachan, one Porter, two Summer Rambo, one Maiden Blush, one Wealthy, one Fall Pippin and three Smokehouse.

A large majority of our correspondents prefer the barrel as an apple package but a surprisingly large number report that they have found it profitable to market their best fruit in bushel boxes. Seventeen persons report good home markets and recommend the use of baskets and bushel crates. Half bushel and bushel round stave baskets with covers are commonly used for shipping summer apples.

Under the present indifferent care in spraying, etc., which many of our orchards receive, the handling of second grade and cull apples is a very important matter. Their proper disposal often

settling the question of profit or loss. In the first place it is very important to provide boxes or crates to receive them from the sorting table to avoid unnecessary handling. Most of our correspondents use their culls for cider or sell them to the cannery, evaporator, or for bulk shipment. We are glad to report that only one man recommends barrelling second grade apples and we wish to make an urgent protest against the practice as most harmful to the trade in better fruit. Dispose of your seconds at home or ship them in bulk, or better still produce no culls and by thorough spraying, good culture and hand thinning produce only first-class fruit.

Pears.

There has been a good or better than average crop of pears throughout the State and in most places the quality is reported good. Where poor or only fair, neglect of tree and lack of proper spraying is the usual cause.

Blight is the one great enemy to pear growing and in some places has almost put an end to the industry. No remedy is known other than the timely application of knife and saw, but it is commonly believed that the germs of this disease enter most freely through the tissues of rapidly growing wood. Therefore, pear trees standing in sod and growing slowly are less liable to blight than when cultivated and making a rank growth. This has been the experience of many of our correspondents. Scale is also reported as a serious enemy.

Fifty-one reports tell of profitable growing of the Keifer pear, when well grown and properly handled, several saying "more so than formerly." Its comparative freedom from blight and scale injury and its early and regular bearing habit are strongly in its favor.

Peaches.

The peach crop has been a fairly good one, only seventeen reporting a failure. A few persons report having had very large crops but this was not at all common. The correspondents are about evenly divided in regard to weather conditions, some deploring the dry weather, others finding in it a blessing. Certain it is that brown rot was much less prevalent than usual this year and that thoroughly cultivated orchards suffered but little from the drouth. Yellows, borers and scale are named as the most serious enemies to peach growing. Only a few reports mention brown rot and curculio this year.

A large majority of the markets accept the four-eighths bushel round basket with favor, while the six basket carrier is found satisfactory for fruit of the best quality. A few persons recommend smaller baskets, especially for retail selling.

In answer to the question "Are peach trees being planted?" nine persons answer "no," nineteen answer "yes," and a great number say "to some extent." The counties in which considerable planting is reported are Bedford, Berks, Bucks, Chester, Dauphin, Franklin, Lancaster, Lebanon, Montgomery, Mercer and York.

The Carman peach is highly recommended as a hardy, frost-

resisting variety, having succeeded the past season under conditions which destroyed the buds of nearly all others.

Plums.

The plum crop was good in a few places but a large majority reported no crop this year, in many cases the conditions for setting of fruit having been quite unfavorable.

Curculio and brown rot seem to be the most serious enemies to successful plum growing. A few reports speak of black knot and San Jose Scale, the latter especially on Japanese varieties.

The vote for best varieties for home use gave a tie for German Prune and Lombard, next Burbank, Abundance and Damson, Bradshaw and Green Gage. Wickson, the Chairman's choice of all the Japans, received only three votes. If making a list from our own experience, we should say: Red June, Climax, Wickson, Satsuma, Green Gage and Shropshire Damson.

Thirty persons report profitable growing of plums and twenty-three say "not profitable."

Cherries.

Reports show the cherry crop to have been a fairly good one, although some varieties and some localities failed entirely.

Brown rot, which is easily controlled by spraying, and birds are given as the most serious enemies, also black knot, rose bugs, curculio and black aphis. Leaf blight, which is serious in many places is easily controlled by spraying.

Early Richmond is named oftenest as the best variety for home use. Montmorency comes next, then Governor Wood, Black Tartarian, Napoleon and English Morello. Windsor had only four votes and Ida three.

Grapes.

Grapes are reported as growing successfully in nearly all sections of the State, though commercial growing is practiced in only a few places.

Black rot is the great enemy to grape growing but can be very largely controlled by bordeaux spraying. In some places the rose chafer does serious injury but those who spray frequently with bordeaux and arsenate of lead will have very little trouble in this respect. Injury by grape curculio is very largely prevented in the same way.

Small Fruits.

In answer to the question, "What varieties of strawberries are best?" we were almost overwhelmed with names and are more than ever convinced that there is no best variety for all places and conditions. Bubach received most frequent mention, followed in order by William Belt, Haverland, Sample, Glen Mary, Brandywine, Gandy, Senator Dunlap, Sharpless and Aroma, and a host of others mentioned only once or twice.

Of the raspberries, Cuthbert, red, and Greeg, black, received the same number of votes, followed closely by Kansas and Cumberland, both good black varieties.

As usual Snyder leads the blackberries in popularity; next in order come Eldorado, Kittatiny, Erie and Ancient Briton.

Very few persons report success in growing dew-berries, the winters being most too severe for them. Where they grow well, the Lucretia dew-berry is an excellent fruit, and to our taste excels any of the black-berries.

Potatoes.

A large majority of the correspondents agree that there is no better crop for planting in the young orchard than potatoes, their fertilizer and culture requirements being well suited to the needs of the trees. A few persons prefer general gardening with peas, beans, tomatoes, sweet corn, cabbage and melons. Two suggest strawberries and one friend from Lancaster says tobacco.

Very few persons in the State have found the past season favorable for the potato crop, continued drouth through the most of the growing season being the cause. The most destructive enemies in unsprayed fields are blight and the Colorado beetle. When thoroughly and frequently sprayed there need be no loss from either.

Many persons have learned to control potato scab, the most favored way being to soak the seed for one hour and a half in a solution of two ounces of corrosive sublimate to sixteen gallons of water. Formalin, or formaldehyde, can be used in the same way, one pint to sixteen gallons of water.

A few of our reports recommend planting potatoes in checks, thirty by thirty inches up to forty by forty inches, but most persons prefer to plant in rows varying from twenty-four to forty-two inches apart. Thirty-six inches is most favored and is well adapted to cultivation and spraying with two horse tools. Some growers plant as close as ten inches in the row, others up to twenty inches, more correspondents preferring twelve inches than any other distance. A good number named fifteen inches, which we believe to be about right under most conditions.

Spraying.

We are glad to report that spraying for insects and fungi seems to be steadily increasing, but we are sorry indeed to report the deplorable fact that seventy per cent. of our correspondents tell us that spraying is not thoroughly done. Until this condition is overcome and the percentage at least reversed, our State cannot expect to make much progress in its war against these enemies. We will venture the assertion that fruit growers in the Hood River Valley of Oregon could report 100 per cent. of thoroughness and that in this very matter of thoroughness lies the secret to their great success.

Reports seem to indicate that only in districts where fruit growing is followed, at least to some extent commercially are growers awake to the possibility of controlling the codling moth. We

are much interested in the extent to which arsenate of lead has replaced Paris Green as a spray for this insect. Its adhesiveness is, of course, the feature which recommends it so strongly. Many persons use arsenate of lead combined with bordeaux deriving excellent results from both.

Scale seems to be held in check, at least to a considerable degree. We believe that the sections from which failure is reported are lacking in thoroughness of work. Many of our careful men write, "We no longer dread San Jose Scale."

In answer to the question "What is the most satisfactory and effective scale spray you have used?" the answers were as follows: Lime-sulhpur wash 26, Commercial Soluble oils 23, divided as follows; Scalecide 17, Target Brand Scale Destroyer 3, unclassified 3. Two persons recommend the use of kerosene. It is not our purpose to make any recommendation but rather to emphasize again our belief that in careful and thorough spraying lies the key to success in controlling San Jose Scale. In a great many cases an effort to economize material has resulted in most dismal failure. We are frequently told that soluble oils should be sprayed with very fine nozzles and we believe it is a matter of vital importance in their use.

Orchard Management.

Our question as to heavy pruning of apple trees brought out a wide difference of opinion, our correspondents being almost equally divided. We can summarize these opinions in the statement that some varieties require much heavier pruning than others and that the pruning should be done annually to avoid removing too much wood from the tree at one time.

Some reports recommend very light pruning of peach but a much larger number prefer to cut back and remove about one-half of each year's growth.

In answer to the next question, we received a distinct surprise when nearly every correspondent expressed himself as believing that apples can be thinned profitably. This is certainly more than we expected from Pennsylvania apple growers.

Only seven out of the whole number of reporters expressed doubt as to the importance of keeping bees in connection with fruit growing. A few experienced growers report having proven the practice to be of great importance.

Orchard Values.

The question of the value of orchard trees over and above the value of the land, is often raised. Most of our correspondents say that an apple tree planted in a suitable place and growing at the end of one year, is worth one dollar; that its value increases at the rate of one dollar per year and that the increase continues up to twenty years or more, depending on the variety. This value is based on the ability of the tree to pay a good dividend on such an amount and we believe it to be very conservative. Not a few growers doubled these values in their reports.

Good Roads.

Feeling that the fruit grower and market gardner is probably more interested in the improvement of country roads than almost any other citizen, we have asked questions along this line.

The question of good roads seems to be a decidedly live issue in all parts of the State. A large majority of our correspondents favor the building of main roads entirely by the State. Many of them are opposed to putting the State's money into one main road or parkway from Philadelphia to Pittsburg, feeling that it should be divided between the counties on the basis of present road mileage. This is also the view of your Chairman who is utterly opposed to putting all the available road money into one road for the use of a comparatively small class to the exclusion of road improvement in the balance of the State.

Throughout the reports runs a decided note of dissatisfaction with the administering of the present road law. The feeling is strong that the roads built by the State in the past few years have cost far more than they should have done, running as high as $22,000.00 per mile for one piece of road in Lancaster county. The freedom with which "extras" are charged up raises a natural question in the minds of interested persons. Contract for a piece of road 8,300 feet long in the Chairman's own district was let at $19,500.00, which was about $3,000.00 above the estimate of the Department; alterations and changes were made from time to time, many of them apparently favoring the contractor and the price of the finished road was $27,971.00, or $17,688.00 per mile, $8,400.00 more than the contract price and an advance of just about 70 per cent. over the estimated cost as prepared by the Highway Department and presented to the township supervisors to secure their sanction for building the road.

The President.—This report is now open for discussion. If you have any questions to ask the Chairman of the committee he will be pleased to answer them, and if you have any criticisms to make, or any suggestions to offer, he will be glad to receive them.

Mr. Jamison.—Would it not be proper for us to extend a vote of thanks for that full report? If you want that as a motion, I will make the suggestion as a motion.

This motion was duly seconded, and carried.

The President.—I am pleased to extend a vote of thanks from this Association to Mr. Tyson for the excellent report.

Prof. Surface.—While the subject has been touched upon by the Chairman of this committee, I would like to ask whether there are any of the members here who have ever used salt to cure pear blight. I have not had the time to try it myself, but would like to hear from the members here. I have had reports from several parts of the State saying they had used salt for pear blight. It was

applied to the roots of the tree. Did you hear anything of this from your correspondents, Mr. Tyson?

Mr. Tyson.—No one answering my inquiries has referred to it. I have not heard of it and I am inclined to doubt its value for this purpose.

Mr. Fenstermaker.—Is it applied after the blight has appeared on the tree?

Prof. Surface.—I, myself, have not used it, but I have letters from people saying they have used it for the blight, and have cured it. I would like to hear from some one in the audience who has used it. I would like to say that when we hear of a thing being a remedy, that is not in the books, I think it is well to discuss it at our meetings, because I am sure the purpose of our meetings is to acquire knowledge that will help us in our work. Therefore, while I have not used this remedy myself, I would like to hear from any one who has used it. I have letters from several people, particularly from Bradford county, saying that they cured pear blight by the use of salt, but whether the trees were blighted, or only the roots, or to what extent, I don't know.

The President.—I would like Prof. Watts to tell us whether this could be so.

Prof. Watts.—No; I have never seen salt used for pear blight; I have seen it applied to current bushes this year, and it killed every one of them. I can conceive of it being applied to a pear tree in such a manner as to materially affect the vitality of the tree. Heavy applications of it might probably affect the blight, but would also affect the vitality of the tree to that extent.

Mr. Bartram.—I would like to say that I tried salt on peach trees; I had some one-year-old trees to which I applied it in the proportion of one pint of salt to a pint of ashes and put it pretty close to the tree; the result was that they died.

Mr. Fox.—I have been handed a paper by the Chairman of the General Fruit Committee, which was sent to him in connection with the report from Berks County. I have been requested to read this report in reference to the San Jose Scale.

The President.—I would like to say that Mr. Fox was for many years chairman of the General Fruit Committee, but for the last four or five years he has been out of the State.

Mr. Fox.—I have been for the last six years in Virginia—the State of my friend Prof. Heiges. It is a very good state to come from. They had their meeting down there on the 6th and 7th, in Lynchburg, and it was a very large meeting. The meeting here is very large to-day—much larger than I have been in the habit of

seeing; still that meeting at Lynchburg was a larger one, and very well attended by members from the hundred counties of the state with the exception of those in the southwestern corner, where hey have nothing but coal and ores, and grow very little fruit.

SAN JOSE SCALE.

By Cyrus T. Fox.

The discovery of the San Jose Scale's presence in Pennsylvania was first made known in December, 1894, and in a report to the State Board of Agriculture made by the undersigned in the following month, remedies were given whereby it could have been successfully resisted. Copies of this report were ordered to be printed, but there was the usual delay that is experienced in getting out State documents, and a fire in the State printery aggravated the matter. When the reports finally reached the writer's hands they were sent to every newspaper in Pennsylvania, with the request that the facts concerning the scale be published. Many editors courteously acceded to the request, and some called attention thereto in their editorial columns.

Had there been a general compliance with the instructions given in the information sent out at that time (14 years ago), the present very general warfare that is being waged in Pennsylvania against the pest would be unnecessary. It would seem, however, that it takes a long time to secure an awakening in such matters. Where only three cases of the presence of the "scale" were reported in the winter of 1894-95, and these were comparatively isolated, the progress of the insect was so rapid that in the course of a year it had made its appearance in 12 counties. This was largely due to the fact that scarcely anything was done to combat it. At the end of the next three years there was scarcely a county in the State that was exempt from its ravages.

Even now the San Jose Scale is not being fought by growers as it should, and it has been found necessary to start a special train through the state with spraying material and outfits and a corps of instructors to arouse farmers and fruit growers on the subject. Thousands of dollars are thus being spent for the giving of "expert" information. Notwithstanding all these efforts, it is doubtful if the farmers of the State will unite in maintaining the warfare of their own accord. For that reason we have answered question No. 2, on spraying, by saying that the work is being thoroughly performed "when done by the representatives of the State."

There is no question as to the efficacy of the work of that section of the Department of Agriculture known as "Economic Zoology," but it is to be feared that too much reliance will be placed by farmers upon the prospect that this movement will be continued by the State authorities, and that to secure the preservation of their orchards all that will be necessary will be to request the Economic

Zoologist to send along a spraying "expert," with his outfit, when the work will be done without any expense to the petitioners.

This would be well enough if a sufficiently large appropriation could be obtained from the Legislature for each season's operations, so that plenty of men could be employed to spray all the orchards—the State being divided into districts; but it would seem that after the farmers have been educated in regard to preparing the spraying mixture, and the mode of applying it, they ought to give the subject proper attention every season thereafter themselves. Although there are laws on the statute books for the prevention of the spread of diseases in fruit trees, and the extermination of insect enemies, some further legislation appears to be needed to compel greater attention to be given to these important matters.

Probably the chief trouble is that the orchard is depended upon largely for results without a thought that cultivaion and care are necessary. The farmer is, perhaps, too much engrossed with other duties. The raising of grain or special crops may be more profitable. The dairy and hennery, with butter and eggs commanding prices that can be considered highly remunerative, may be regarded as all-important, and the orchard be consequently neglected. Indeed, fruit-growing is such a branch of agriculture (or horticulture, if you please) that it should be made a business of itself. It is only by close application to all requirements, and assiduous attention, that fruit growing will be successful. With a proper observance of the methods that have proven advantageous in the raising of fruit there can be no better-paying industry.

Pennsylvania, in addition to her supreme position in the galaxy of states on account of her mineral wealth, is great in agriculture and horticulture. As a producer of apples she is second on the list, and possessing, as she does, apple belts of superior soil and location, should stand at the very head, excelling even New York, whose climate, particularly in the western section, is so very favorable for the apple. But Pennsylvania must have a little care that her honors are not taken from her. Virginia, where the writer has spent much of the past six years, is forging to the front as a fruit-growing state. Commercial apple orchards have been established containing from 45,000 to 100,000 trees. Apples are being exported to England, where $5.50 to $6.50 per barrel is obtained for fancy fruit. One dealer in Richmond made two shipments during the season just closed of 25,000 barrels in each shipment, mostly of one variety of apples, the Albemarle Pippin. In fact, but two or three varieties are considered profitable, and in an orchard of 50,000 trees the only other variety than the Albemarle Pippin will likely be the Winesap or Mammoth Black Twig. The Ben Davis, once very popular, has been relegated to the rear. The York Imperial, a Pennsylvania favorate (a native of York county), is doing so well in Virginia, that it is being quite generally planted. It grows to greater perfection in the Old Dominion, and its fine appearance and desirable quality as a good keeper make it very popular. By some persons it is known as Johnson's Fine Winter.

Prof. Watts.—In connection with the excellent report of Mr. Tyson, I would like to hear at this time a discussion of the best win-

ter varieties of apples for Pennsylvania. It is not only the variety that will yield the most bushels that should be planted, but that variety which is most wanted by the markets and which will produce the best returns in dollars and cents. We not only want quantity, but we want what will yield the best returns on the market. I should like to hear this question discussed here to-day.

Mr. J. D. Herr.—In the article read by Mr. Fox, reference is made to the fact that fourteen years ago it was almost impossible to interest the farmers of the State in San Jose Scale, while to-day that subject is one of the utmost importance to them, and I hope to hear this subject fully discussed as we go along.

Prof. Surface.—There is one point in that excellent communication that I want to press a little farther; it is impossible to arouse the interest of the public in something that has not gone far enough for them to see the importance of it. Fourteen years ago the Scale was not serious enough to arouse the interest of the public to the importance of fighting it. But let us go to-day to the counties that have had the Scale, like Berks, York, Adams, and some of the others, and announce that there will be a public demonstration in regard to the San Jose Scale, and there will be a larger attendance than at any other agricultural meeting. They have had enough of it and they want to conrtol it. And we find that the men who are most successful in its control, are the men who have come most to our meetings and have followed these denominations from day to day. These are the men who have the largest crops of fruit, because they have been obliged to see what it means.

Regarding the subject which Prof. Watts brings up, in reference to the varieties which should be planted as the commercial winter apples of the future, that most depends upon the education of the market. If the market of the future calls for a firm red apple, orchardists will continue to plant the Ben Davis or Gano; if it wants quality, then the yellow apple, like the Grimes Golden will be the best variety; if it wants a red apple, we can give them the red Grimes, the Jonathan, but I think the time will come when the market has been educated, that it will not ask what the color of the apple is, but what is the variety, the same as they do in the potato to-day. When the public becomes educated up to the fact that variety is the standard of excellence, we will be able to sell the Stayman Winesap in preference to the Ben Davis. The Ben Davis is 25 cents higher in the Philadelphia market than it is in any other place, while the Grimes Golden is way down the list, simply because the public has not been educated to variety as the standard of excellence, rather than color.

Mr. Youngs.—It strikes me that the question of apples is quite a question of locality as well. Now, what succeeds well with you here, would not succeed with us up in our part of the State, and in selecting a standard winter variety, you must also take into consideration the locality. I am a Pennsylvanian, have always lived here, and was born here, so that I am pretty close to home in Penn-

sylvania, and I certainly think if I were going into the apple growing business, I would do it right here on the hills of eastern Pennsylvania.

Prof. Stewart.—What variety would you grow?

Mr. Youngs.—As I have said, I don't think I would name any variety, because what succeeds with us up along the Niagara belt, on the shores of Lake Erie, would not succeed here. We are in the famous Chautauqua belt, and the grapes that succeed best with the growers in that district, succeed best with us also but if I were going into the apple growing business extensively, I think I would try to grow an apple that has succeeded in my particular locality for a good many years.

Prof. Stewart.—In reference to this apple question, I have been for a long time somewhat undecided in reference to apples of the Ben Davis type. As Prof. Surface has said, the Ben Davis has been receiving 25 cents per barrel more on the Philadelphia market than any other kind, but if you will look at the New York markets, you will find that the Ben Davis brings from $3 to $3.25 a barrel, while the last quotation for Baldwins is $5. You see the New York market is becoming educated. Then, again, I see the Jonathan being quoted at $5, while the Ben Davis is only $3. Now, there are other things against the Ben Davis in this state, and one of these is its susceptibility to the San Jose Scale. I don't know of any other single variety that has seemed to be so susceptible as the Ben Davis. The Gano has seemed to be almost as susceptible, and so have one or two others, but on the whole, the Ben Davis seems to be the worst, and for this, if for no other reason, I think it should be replaced by a better variety.

Mr. Youngs.—In taking up this question of education, we must take into consideration several things. In appearance the Ben Davis is large and red, and a good bearer, but in quality it is a different thing. The Ben Davis is poor as regards quality. It is something like the Elberta peach; it is large, and, as the saying is, "hand-painted," and people take to it because of its pretty appearance. Just like the Ben Davis, they buy it by the eye. Now, you take Red Raspberries. There is the Marlboro', for instance; the Cuthbert is far superior in quality, but the market wants a berry that is large and red, and looks fine, and the Malboro' goes to the market in better shape than the other, and so the market calls for it, so that there are really two sides to the question—the demand of the eye, which is for appearance, and the demand of the palate, which is for quality, and unfortunately the demand of the eye, in the average buyer, is still too prominent a factor for us to ignore.

Mr. Jamison.—Mr. Youngs is striking the key-note. Now, the market for our apples is made in Europe and they want a red apple. Of all our red apples, of course, the Baldwin is the favorite in this country, but there is no doubt that for shipment to England or across the sea, the Ben Davis carries well, it looks well, and

remains firm, and is therefore a good export apple. A friend of mine asked me recently what I thought of the Ben Davis apple, and I told him it beats *none* all to pieces. He wanted to know why, and I said because we can raise them when we can't raise anything else. Now, the market is usually not discriminating, because the buyer of the apples does not eat them, as a rule; he sells them. Once in a while, they get to know a little something about the quality, but as a rule, the dealer buys them only to sell them. A dealer who had been buying apples from the West the last few years came to my place last fall, and wanted to see our orchards and asked whether we had any apples; I was not home, but my son told him we had, and asked him what kind he wanted; he said "I want any kind but Ben Davis and the Bellflower." My son said: "We have not got the Ben Davis, we have the Gano. "Well," he said, "that is what I want."

Mr. Hale.—May I, as a stranger, say a word?

The President.—You are not a stranger, Mr. Hale, and we are always glad to hear from you.

Mr. Hale.—The San Jose Scale has been the cause of a great deal of expense in our orchards, and it is the public, in the end, who will have to pay the bill, just as is the case where my friend here on the left said that the people who buy the Ben Davis don't buy it to eat, but to sell; the consumer pays for it.

A few weeks ago I was up in New York State where they raise a great many apples and pears. Two strangers came in there to buy, one of them a buyer for a large firm, and the other a private gentleman of means; the buyer did not look at the Ben Davis, but he paid more per box than you were speaking of per barrel, for what he wanted. The other man, too, was in search of quality; he bought them a bushel at a time, and had them sent to his home, but he would not buy the Ben Davis; he called it a corkleg, only covered with skin. Traveling up and down the coast, as I do, from my New England farm to my Georgia farm, I have apples offered me at the station and on the train, and I have been tempted over and over again to buy the Ben Davis; when real hard up, and my flask was empty I have occasionally bought the Ben Davis, then vowed that if God would forgive me, never to do it again. The people who pay your bills, who pay for your improvements, and for your farms, and for your horses and tools, and your fertilizers, they are the consumers. The consumer is the fellow you have to get up against in the long run, and what you want to do is to make your apples so good that instead of buying a few Ben Davis now and then, he will eat a dozen apples a day ,and his wife will want them, and his children will want them, and there you have your market. Give them something good, and they will like it so well that they will pay you for it. If you want to get the consumer to buy your fruit, make it so good that he can't do without it. You want color, and beauty to attract the eye, and in addition to that you want quality to attract the taste. This is what you people of the Horticultural Association want to bear in mind.

Dr. Mayer.—I think the professor on my right is on the right track in investigating the profitable apples for Pennsylvania. Now quality, as the gentleman has said, is one of the first considerations. Quantity is not the prime consideration, important as that is. Right over here is an apple that sells at 35 cents a quart box, and I don't believe it beats some apples that are not attractive enough to command that price. The first demand for an apple now is that it must be attractive, and then must have all the quality we can get into it.

Mr. Geo. H. McKay.—I am not a raiser of apples, but I am an eater of apples, and I keep them in cold storage. When I first went into the market fifteen years ago, the Ben Davis was the highest priced apple on the market. Then the Baldwin and the Greening came in, and they, to some extent took its place. Finally an apple came on the market which attracted the attention of the stores, and sold for fancy prices. I tried to find a good market for it, and sent several barrels to Boston and Philadelphia, with instructions to have them taken home and used, and then report to me. The report came that they were a good eating apple, cooked well, baked well, and made good pies. That was the Stayman Winesap. Prof. Surface may have looked at the markets in September, and found the Ben Davis commanding a higher price, but if he were to go to market now, he would find that the Stayman Winesap could not be had at any price. The Stayman was sold out the 1st of January, and Jonathans will bring $5 to-day, and I don't know but you could get $6, while Ben Davis is down about where it was. This simply shows you what the Stayman Winesap is doing. The Ben Davis is like the western apple, good to look at, but not quite so nice to eat. The Ben Davis is a fairly good seller in the Philadelphia market, but New York and Pittsburg want a little higher grade. It does not do so well there.

A Member.—While all this is very interesting, I was at a meeting at the Carlisle Indian School, and I heard Prof. Snrface there recommend the Ben Davis as one of the best apples to grow. I had a laugh all to myself, because I had four or five hundred bushels, and was going all over the country trying to sell them and could not.

Prof. Surface.—Is there anyone else here who was at that meeting? I would like to have somebody to make good on that.

Mr. Gossard.—I think I can help Prof. Surface. I am the superintendent for one of the Fruit Growers of Franklin County, and we stated that we got a higher price for the Ben Davis than for any of our other apples, and Prof. Surface said that was, of course, the apple for us to plant then.

Prof. Surface.—There is the point. I am glad there was some one to corroborate me. Col. Middleton said he was selling his Ben Davis apples at $4 right in his orchard; that the Ben Davis was a money producer right here in this region, and I said, of course, under those circumstances that is the apple for you to plant.

A Member.—Can you sell the Ben Davis twice to the same dealer?

Prof. Surface.—Once; the second time you sell him the Gano.

Prof. Watts.—I rather like the suggestion made by Mr. Hale that we make our fruit so good that people can't do without it. About this apple—I will not name it—why say anything about it at this meeting? I heard another name for it up in New York State; you know it is usually put on the table along with a few other apples, and they call it there the "Stay" apple. I asked how it got that name, and they told me it always stayed on the table.

The gentleman in the rear who spoke of the condition of the Philadelphia market is all right. The unnameable apple is now selling at $3, while the Stayman could not be had for less than $6.

Mr. Youngs.—Last year the apples that ripened slowly, like the Northern Spy, were up to the normal in quality, while those that ripened earlier were very dry and defective in quality. The later apples received the benefit of the rains that came on after the long dry spell we had, while the earlier apples suffered as the result of that drouth.

Mr. McKay.—In reference to Mr. Wertz's apples, I want to say that I visited his orchard, and he had some of the most splendid apples I ever saw. He sold some of his first Jonathans, I think, for $4, and not long before Christmas the dealer retailed them for $12, while the Ben Davis was bringing only $2 to the producer.

Mr. Good.—The gentleman says the dealer sold them for $12; what did the producer get?

Mr. McKay.—He received the $4, and that was the highest I have ever known the market to go.

Mr. Newcomer.—We get a better quality of Ben Davis on a good sandy, or sandstone soil than on any other it is grown on.

The President.—We have gotten a little away from our subject and while it is very interesting, I think we had better go back to our subject, and take up the next number on the program, which is closely allied to it—an address by Prof. Stewart on the result of Orchard Experiments. While Prof. Stewart is getting his map ready, I want to announce the following committees:

Committee on Nomenclature and Exhibits: Mr. J. Hibberd Bartram, Mr. H. C. Snavely, Mr. J. D. Herr, Dr. I. H. Mayer, Mr. D. Z. Detweiler and Mr. F. H. Fassett. I would like them to report on these apples by to-morrow morning. I have made this committee large so that they may be fully able to advise themselves;

we have some of our older fruit growers here, and they may be able to supply the names of some of the unfamiliar varieties.

Committee to represent us in the Allied Agricultural Organization: Mr. E. C. Tyson, Mr. R. M. Eldon, and Mr. E. B. Engle.

Committee on Resolutions: Mr. R. M. Eldon, Mr. A. W. Stephens, and Mr. E. E. Persing.

Prof. Stewart will now make his report on the result of Orchard Experiments.

ORCHARD FERTILIZATION.

Prof. Jno. P. Stewart, *Asst. Professor of Experimental Horticulture, Pennsylvania State College.*

In fruit production, there are at least four factors that are essential in securing maximum profits. Assuming that location and varieties are proper, they are soil management, fertilization, pruning and spraying. Each must be right. No one of them can be singled out and made to carry the load of others left undone. Any one or part of one neglected may become the crop-limiter of that orchard and the extra care devoted to the others is lost. The truth of this principle is emphatically shown in figures which we have recently collected in a study of costs and profits in fruit growing. These figures show that in the case of the apple net profits have actually increased with expenditures up to more than $300 per acre for producing and marketing the crop. Thus in fruit growing as elsewhere one gets returns exactly in proportion to what he intelligently puts into it. To increase this intelligence, we look into one of the most complex of these production-factors, orchard fertilization.

In the country as a whole, orchard fertilization is not being neglected. The last census shows that the size of the orchard-fertilization bill is about $2,000,000 per year. Fruit farms expended 30 cents per acre for fertilizers as compared with 4 cent on hay and grain farms, and 2 cents per acre on stock farms. Whether this expenditure is being wisely made or whether it is sufficient is the question. At the present time, we have no exact system of orchard fertilization and little accurate data upon which one may be based.

The systems of fertilization now in operation or recommended are based on four things: (1) analyses of trees and their crops; (2) general experience and observation; (3) orchard surveys; and (4) experimental studies. Each has its strong and its weak points. For example, analyses show that an acre of bearing apple trees takes up about 55 lbs. of potash (K_2O) per year. But the fact that they have this potash does not prove either that they must have it or that its addition to the soil would secure any material response. Indeed, the same analyses show the annual possession by the trees of 57 lbs. of lime per acre, and yet lime is not generally considered important in orchard fertilization.

There are similar weaknesses, with the other sources of evidence. General experience and observation fail because of their lack of checks and their local application. Orchard surveys furnish the wide application and are very valuable on this account, but they can not completely isolate any one factor, and they are confined to current practice. Experimental studies are confined to comparatively few trees and soils, hence, must be more or less local. They also require long periods of time. But in spite of defects, each of these sources of evidence furnishes something and the final solution of the problem will depend upon them all.

In this discussion, we are concerned with the experimental evidence. The apple is not an easy crop to deal with experimentally. The difficulty of getting uniformity in soil and varieties over the large areas required, the perennial nature of the plant with its resulting food-storage for early spring growth, the continuous cropping without chance for rotation, and the sensitive and fickle bearing habit are a few of the difficulties that face the investigator. They make it necessary to forget some of the methods found applicable to other crops, and they require that the whole problem be studied from its foundation.

In view of these difficulties, there is a very fair amount of experimental evidence already at hand. Three valuable, long-time experiments have been made. The first of these has been in operation at the Woburn Experimental Fruit Farm in England, since 1894. Up to the close of the 14th season, there had been almost total absence of effect of manure of any kind. In a more recent test on poorer, sandy soil, they report that manures and especially stable manure, are having a very beneficial action.* The absence of effect in the longer experiment was explained by "the fact that trees draw their nourishment from a very large area, and from a very considerable depth, * * * * * * * * and, hence, are very little affected by surface dressings."* This experiment is of value in showing that some orchards are limited by something other than manures and fertilizers. It is also interesting in the fact that while the experiment as a whole shows no results from manures, yet it is reported that certain July applications of nitrate of soda produced distinct effects. The applications of nitrogen in the regular experiment were made in February. While this experiment undoubtedly has the values indicated, yet its full application to our conditions is somewhat inadvisable because of the marked difference in English conditions, and the fact that the experiment is being conducted on dwarf trees.

The second, long-time experiment is the one made at the Geneva Station, New York, and reported in 1907 by Professor Hedrick. This gives the results of twelve years of annual applications of potash and phosphate, at the rates of 169 lbs. K_2O, and 129 lbs. P_2O_5 per acre. The trees were 43 to 55 years old and the soil is a medium heavy clay. The results as a whole were considered negative, since the annual increase in yield of all varieties on the treated plots barely paid the cost of the fertilizers and their application.

* Letter of Spencer U. Pickering, September, 1907.

The results in detail are shown in Table No. 1. The first three lines of the table are taken from Professor Hedrick's report, page 225. The last three lines we have calculated from them, since the trees were set 48 to the acre.

Table 1.

New York Results. Potash and Phosphate Applications. 12 yrs.

	Baldwin		Fall Pippin		Roxbury		R. I. Greening		Northern Spy	
Annual Averages (Bu.)	Treated	Not Treated	Treated	Not Treated	Treated	Not Treated	Treated	Not Treated	Treated	Not Treated
Yield per tree, . . .	8 78	8.50	7.23	6.18	11.16	8.51	8 38	8.72	7.90	5 35
Yield per acre, . .	421.4	408.	347.	296.6	535.7	408.5	402.2	418 6	379.2	256 8
Benefit,. . . .	13.4		50.4		127.2		-16.32		122 4	
Per Cent. Benefit, . .	3.1 per cent.		17 per cent.		31.5 per cent.		-3.9 per cent.		42 per cent.	

In our judgment, one of the most striking things shown in this table is the *difference in response* to fertilizer made by the different varieties. The Baldwin and R. I. Greening were practically unresponsive, while the Spy and Roxbury show an *annual average benefit* of nearly 125 bushels per acre. It did not pay to add fertilizer to the Baldwin and Greening trees, while even at the low price of $1 a barrel the Spy and Roxbury returned a *net profit* of nearly 180 per cent. on the cost of the fertilizer. This apparently indicates that the value of a fertilizer may sometimes depend upon the variety fertilized. But it should also be remembered that only phosphates and potash were applied in this experiment, and it is stated elsewhere in the report * that "leguminous cover crops plowed under in the orchard have usually produced beneficial effects the same on the next season," and that "it needs nitrogen, or humus, or the physical condition to be obtained by plowing under organic matter." In other words, nitrogen or humus is apparently the crop-limiter in this orchard and until this need is met, little or no advantage can be gained by applications of other forms of plant food. Hence, we conclude that instead of being negative, the least that can be said of this experiment is that it shows *partial results* from the application of certain fertilizers.

The third experiment is in Massachusetts, a preliminary report of which has been kindly furnished us by Director Brooks.† This experiment has been running at the Massachusetts Station during the last 30 years. The trees were planted one year after the experiment was started and the plots contain three trees each of Baldwin, R. I. Greening, Roxbury and Gravenstein. The soil is a "moderately heavy, gravelly loam, with a moderately compact (clay) subsoil," and is reported to have been "highly exhausted, chiefly by the production of hay, before the experiment started." The treatments and results we have arranged as shown in Table 2.

* Page 231, Bulletin No. 289, N. Y., Geneva Station.

† Letter from Director Brooks, November 30, 1903.

Table 2.

Massachusetts Experiment on Apples, 1889-1909.
(Treatments and Yields per A., to date.)

Plot	1	2	3	4	5
Annual Treatment, ...	Manure, 10 Tons-Acre	Wood Ashes, 1 Ton	Check	Bone and K C l 600 and 209 lbs.	Bone and Low Grade K 2SO4 600 and 400 lbs.
Present Average Girth, . . .	37.75 "	31.94- "	37 "	30.554 "	35 42 "
Ratios of Girth,..	140-	118.4	100	113	131.5
Totai yields lbs..	17288.5	10150	3354	10958 5	15971.75
Ratios of yields .	515	301	100	327	476
Quality, ...	5	1	4	3	2

Here we have some very positive results from the application of fertilizers. In growth, the trees of the treated plots show an increase of 13 to 40 per cent. over the checks, and in yields, they show benefits of 201 to 415 per cent. The quality of the fruit is also improved in all plots except that receiving the stable manure, in which it is poorest. Manure, although most efficient in securing growth and yield, fails so completely on quality that it takes relatively low rank in final value. The most valuable returns clearly have come fro mplot five, where ground bone and low-grade sulphate were used. This plot also shows a surprising gain over plot four, which differs only in the use of the muriate instead of low-grade sulphate of potash. Whether this superiority is due to the magnesia in the sulphate or to a harmful effect of the chlorine accumulating from the muriate, or to a soil difference can not now be stated. It is being further studied by the Massachusetts Station.

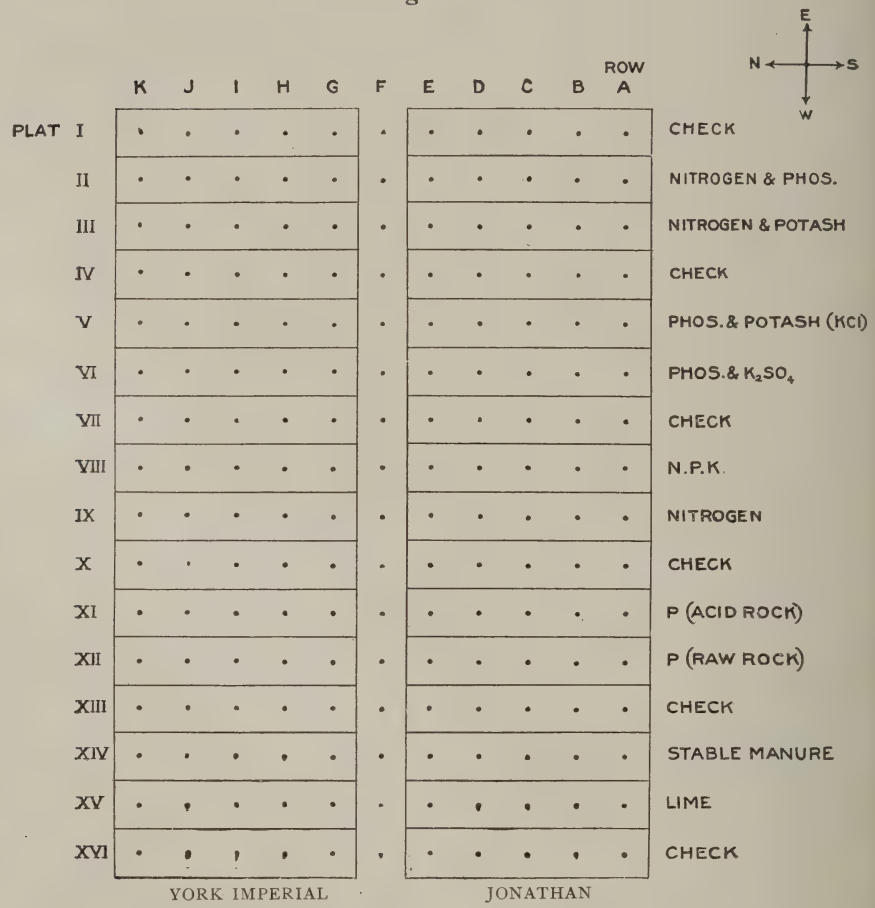
Thus we have before us the results from three experiments in orchard fertilization, running for 14, 12, and 20 years respectively. One shows no results, another partial results, and the third shows very beneficial results. Altogether, they show for a certainty that plant food is a crop limiter, but not in all orchards.

To obtain additional evidence, the series of experiments now in operation in this state were started, as you know, by the Pennsylvania Experiment Station in April, 1907. The series is without the merit of age as yet, but we trust that it has some of extent and plan. An idea of the extent can be obtained from the fact that the records of the past season required the handling of 82 tons of fruit from 2,268 trees. These trees covered nearly 50 acres, and involved ten soil types and twelve varieties. Young orchards to the amount of 42 acres in addition were set during the season.

Before examining the records in detail, we shall outline briefly the work as a whole. The problem placed before us was to determine and study the causes that affect yield and quality in apples. We based our work upon the general proposition that the growth and development of any plant vary with the limiting factor. The possible environmental limiting factors for all plants are moisture, food, heat, light, carbon dioxid and oxygen. Some of these factors are beyond the control of man and, hence, it was decided to study first the influence of those that are more or less within his control.

We, therefore, are now studying (1) the influence of plant food as affected by fertilizers; (2) the influence of moisture as affected by soil management; (3) the influence of cover crops; and (4) the influence of heredity as shown by propagation from best individuals, and by variety.

Figure 1.



Influence of Fertilizers.

This experiment is located with D. M. Wertz, Franklin Co. Others with Tyson Bros., Adams Co., S. M. Brown, Bedford Co., and at State College.

The plan of our fertilizer experiment is shown in Figure 1. The fertilizers are applied annually at the rates per acre of 50 lbs. nitrogen (N), 100 lbs. phosphoric acid (P2 O5), 150 lbs. potash (K2 O), 1,000 lbs. of lime, and 12 tons of stable manure. The results from three orchards ranging from 9 to 19 years of age are shown in table No. 3.

Table 3.

Fertilizer Results, Three Experiments Combined, 1908.

INFLUENCE ON YIELDS. TOTAL YIELDS, LBS.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
X	N P	N K	X	P K	PK 2-SO_4	X	N P K	N	X	Acid Phos.	Raw Phos.	X	Manure	Lime	X
3337	5117	4244	1416	2135	1109	931	2286	2034	1467	707	475	882	1370	643	80
Per cent Benefit.	90	58		70	1.5		98 7	55.5		-45.2	-55.8		59.7	-22 9	

INFLUENCE ON COLOR. PER CENT. COLORED.

69. 2	50. 8	56. 2	58. 5	66. 4	55. 2	47. 9	35	37. 6	60	58 9	69. 3	53. 7	49 2	63 6	75. 9
Per cent Benefit	-14. 8	-5. 9		11. 4	3 8		-16. 9	-18. 4		1	13. 5		-11. 7	-4. 6	

INFLUENCE ON SIZE. AV. WT. IN OZS.

4. 42	5. 03	5. 29	5. 01	5, 22	5. 45	5, 22	4. 97	5, 51	5. 05	5, 65	4. 87	5, 18	5, 18	5. 18	5. 49

Too variable to determine benefit on size.

Influence of Fertilizer Elements. Per Cent. Benefit. 2d Year.

By comparison of the results from the different combinations shown in table No. 3, it is possible to obtain figures showing the influence during the past season of the individual fertilizer elements. Their effect upon yield and color is shown in table No. 4.

Table 4.

Element.	Yield.	Color.
Nitrogen, ...	47.25 per cent.	—17.87 per cent.
Phosphate (P_2O_5), ...	5.8 per cent.	1.56 per cent.
Potash (K_2O), ...	19.00 per cent.	10.15 per cent.
Manure, ...	59.7 per cent.	—11.7 per cent.
Lime, ...	—22.9 per cent.	— 4.6 per cent.

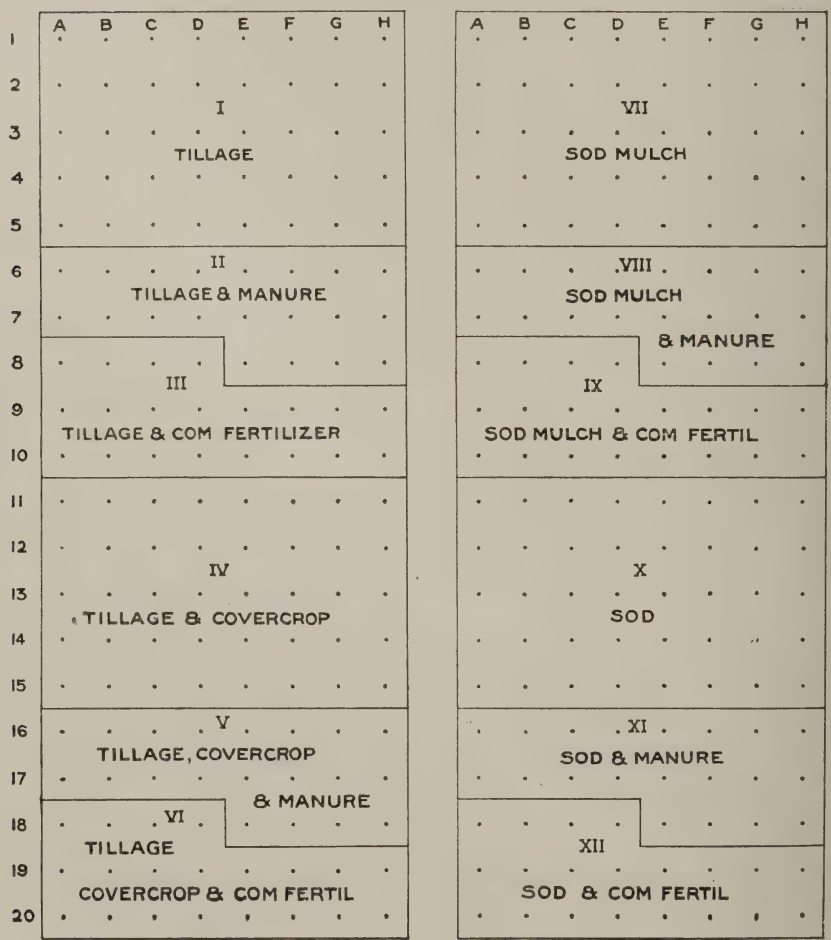
This table shows that both nitrogen and stable manure have materially increased the yield and decreased the color of the fruit. It also shows phosphates to have had but little influence on either yield or color. This seems to be largely because this element failed so completely on the plot where it was applied alone. Where it was used in combination, phosphoric acid showed some distinctly beneficial results. Potash has shown moderately beneficial results on both yield and color, and lime has apparently decreased both. It is hardly believable that lime actually has the harmful effect indicated here, and it will be interesting to see whether or not the indication is maintained in later developments. It is probably one of the transient conditions, which make necessary the long periods required in orchard experiments.

The strong influence of nitrogen both on fruit and foliage is one of the striking features in these experiments to date. This is particularly true in the Bedford County experiment, on a thin, exhausted, stony clay. Its effect in relation to the time of applica-

tion here we believe also to be significant. The first application was made in the form of nitrate of soda as a top-dressing on July 8, 1907. Not only was the effect of the nitrogen plainly evident before the close of August and during the remainder of the season, but the trees of these nitrogen plots came out again into leaf much greener the following spring and showed as marked differences in late May of 1908, before the second application as they had shown in the preceding autumn. This undoubtedly has a bearing on the time for applying *soluble, transient fertilizers* to such perennial plants as apple trees.

Coupled with the Woburn experience, it indicates (though it has not proved) the advisability of delaying such applications until the season's growth is well advanced, but not completed; in other words, until the plant's supply of stored food is about exhausted and available food becomes a limiting factor.

Figure 2.



Influence of Soil Management and Manures.

The experiment figured here is located in Bedford County, with J. R. Sleek. Others with J. H. Ledy, and with John A. Nicodemus, Franklin County, and with F. H. Fassett, Wyoming County.

Figure No. 2 shows the plan of our soil management experiment. Soil management is so closely related to the use of fertilizers that it has seemed inadvisable to completely separate them. This experiment, in addition to comparing the different systems of management, tests the value of commercial and stable manures in connection with each. The stable manure is applied annually at the rate of 12 T. per acre and the commercial fertilizers at the rate of 30 lbs. of nitrogen (N), 60 lbs. of phosphoric acid (P_2O_5), and 100 lbs. of potash (K_2O). On the sod-mulch plot, all grass is left in the orchard and an additional mulch of straw at the rate of three tons per acre is applied annually.

Table 5.

Influence of Soil Management on Yield, 1907, 1908.

Young Orchards	Clean Tillage	Tillage and Cover Crop	Sod Mulch	Sod
Yields 1907, ...	4037 lbs.	3359 lbs.	4425 lbs.	4481 lbs.
Yields 1908, ...	13651	16112	18692	15473
Totals 2 years, ...	17688	19471	23117	19954
Ratios, ...	100	110	130	113
Ratios, ...		100	118.5	
Mature Orchard				
Yields 2 years, . . .		35318	25266	
Ratios, ...		140-	100	

Table No. 5 shows the yields obtained from the different systems of soil management during the last two years. Results for both years are given here because the current year's crop can be more directly influenced by cultural methods than by fertilizers. The results given here, and those in the later tables on young orchards, have been obtained by combining the yields from three orchards of six to fifteen years of age. The mature orchard is thirty-five years old.

As shown in the table, the young orchards have yielded better under the sod-mulch and sod treatments, while the mature orchard is best with tillage and cover crop. Sod-mulch in young orchards shows 30 per cent. better yields than clean tillage and 18½ better than the cover crop method, while in the mature orchard the cover-crop is 40 per cent. better than the sod-mulch. If these differences are maintained by later results, they would indicate that the mulch treatment is of value in developing and establishing the bearing habit in orchards which have reached bearing size and age. Also after this habit is established, the present results clearly indicate that tillage is to be preferred.

Table 6.

Influence of Manures on Yields, 1908.

Young Orchards	Unfertilized	Manure	Com. Fertilizers
Yields, lbs.	23669	41532	34316
Ratios, ...	100	176	145
Ratios, ...		111	100
Mature Orchard			
Yields, 2 years, ...	34635	26540	22881
Ratios, ...	151	116	100

Table No. 6 shows the yields obtained under different methods of manuring in their second year. The orchards are the same as described under table No. 5. The young orchards have responded to the treatments while the old orchard apparently has not. Both commercial and stable manures show distinct benefit in yields in the young orchards, with the latter somewhat in the lead in orchards of both ages.

Table 7.

Influence of Manures on Color, 1908.

Young Orchard	Unfertilized	Manure	Com. Fertilizer
Average per cent of color,	59.89	48.34	44.5
Ratios, ...	100	81 5	78.5
Mature Orchard			
Average per cent of color,	88.3	84.7	86.45
Ratios, ...	100	96-	98-

Table No. 7 shows the results obtained during the past year on the influence of complete fertilizers and stable manures upon color. Both manures have decreased it. The decrease averaged about 3 per cent. in the old orchard and 20 per cent. in the young.

This decrease in color is probably simply due to delayed maturity, the effect being greatest in the young orchards because their general response to fertilizer has been greater. Had picking been delayed a few days on the manured plots, it is quite likely that the differences in color would have vanished.

Table 8.

Influence of Soil Systems on Size, 1908.

Young Orchards	Tillage	Tillage and Cover Crop	Sod Mulch	Sod
Average Wt. in ozs. .	5.9-	6.03-	6.02	5 79
Ratios of systems . .	102-	104	104-	100
Mature Orchard				
Average Wt. in ozs., .		5.47-	5.02-	
Ratios of systems, . .		1.09	100	

Table 9.

Influence of Manures on Size, 1908.

Young Orchards	Unfertilized	Manure	Com. Fertilizer
Average Wt. in ozs., . . .	7.30-	7.79	8.26-
Ratios,.	100	105.3	115.8
Mature Orchard			
Average Wt. in ozs., . . .	4.61	5.65	5.47
Ratios, ...	100	122.5	118.5

Tables No. 8 and No. 9 shows results of the past season in regard to the effect of soil systems and manures on the average size of apples.

Both manures and tillage-with-a-cover-crop have increased the size of the fruit. This is desirable in old orchards, but rarely so in young as the fruit in the latter is already likely to be overgrown.

In the prosecution of the work as a whole, some interesting data have been gathered upon things a little aside from the main lines which we may briefly mention here. The most important of these are on the extent and depth of root-growth, the influence of soil systems on moisture, and their influence on the sticking qualities of certain varieties. As to results, suffice it to say that apple roots extend much farther laterally than is generally supposed, reaching sometimes more than three times as far as the spread of the branches. Soil systems during the past season varied greatly in ability to conserve moisture. On a moderately porous soil in Wyoming County, tillage held the moisture much better than a three-ton-per-acre, sod-mulch system and was vastly superior to sod even when closely cropped and the grass left on the ground. On the tillage plots, under these conditions, the sticking qualities of Baldwin apples were greater by 52 per cent. than on the sod-mulch plots. Northern Spies, however, under identical conditions, showed no material differences in sticking qualities.

To summarize the present status of orchard fertilization we would say that:

(1) Plant food is a crop-limiter in some orchards and in others it is not. Hence, it is a question whether the orchardist should apply manures in quantity until he has evidence that they are needed in his soil.

(2) There is generally little use of applying fertilizers without at the same time giving proper attention to the other factors of fruit production, viz: soil management, spraying, pruning, and general orchard care.

(3) After the other factors are right, if the trees are deficient in growth, foliage, or fruit, it is probable that an application of fertilizers will produce beneficial results.

(4) The indications are that nitrogen has more value as an orchard fertilizer than is generally accorded it, though it should be used judiciously on account of its effect on color. It can be used most freely on the earlier soils or in localities with rather long

growing seasons. It is probable that failure to secure results on apples from the application of potash and phosphates may be often due to a deficient nitrogen supply, which thus becomes the limiting factor for that orchard. If applied in the nitrate form, the time of application must be right.

(5) The greatest actual improvement in value of fruit has been secured on plots receiving phosphoric acid and potash in the form of low-grade sulphate. The exact cause of this is not yet known.

(6) Where plant-food is needed, we can not now improve upon the general recommendation of stable manure or leguminous cover-crops alternated with a fertilizer carrying about 30 lbs, of nitrogen, 60 lbs. of phosphoric acid, and 100 lbs. of potash per acre.

(7) To accompany this system of fertilization, the indications are that the proper soil management for most situations is tillage with a leguminous cover crop while the orchard is young, followed by a mixed lemuminous sod or sod-mulch when bearing age and size is reached. After the bearing habit is established, a return to tillage every second or third year should be made, increasing the frequency of tillage with the age of the orchard and the demands of the fruit.

The President.—If you have any questions you wish to ask the Professor, we will be glad to receive them.

Mr. Fenstermaker.—Will that result from tillage hold good on a steep side hill?

Prof. Stewart.—That brings in an entirely different matter. Our work is to find out what is the effect of the various systems of soil management on yield. We find that tillage and cover crop is distinctly best in orchards in which the bearing habit is established. In the side-hill orchard, it would not always be practicable to apply this system, because they would wash, but if you can prevent the washing, I don't see why the effect there would be any different from that in any other orchard.

Prof. Surface.—The question has been asked here, to what depth were the orchards cultivated and with what implements,—that is, on old orchards—and for what purpose?

Prof. Stewart.—Three or four inches. The main purpose of tillage, as I see it, is to conserve moisture. A four-inch cultivation will do that as well as a deeper one, and will avoid unnecessary injury to the roots. The implements used were plows, or double-action discs or spading harrows, followed by spring-tooth and smoothing harrows. I don't see that there is any objection to any implement that will thoroughly stir up the soil and keep the weeds down.

Prof. Surface.—If it should be a rocky soil, would it be broken up?

Prof. Stewart.—Yes, unless there was too much rock.

Prof. Surface.—How late do you till?

Prof. Stewart.—Up to the 1st of August, this year, although there was very little tillage done in July, there was no need of it either to preserve a mulch or to kill weeds. The reason for this tillage up to August was that we wanted to sow our cover-crop at that time. This was because we thought the chances were better then for enough moisture to get the seed started. And there is plenty of time after that in most Pennsylvania orchards for proper fall growth.

Prof. Surface.—What do you sow for the cover crop?

Prof. Stewart.—A combination of alsike and medium red clover this past year. We have added hairy vetch in some cases, and have used it and rye in others.

Mr. Good.—I would like to ask the gentleman if cultivation, especially where it is a little bit rocky, so as to bring the roots near the surface, does not injure the roots a few years afterwards? Then, another thing; don't the cover crop in the orchard absorb a great deal of the moisture that the tree should have just at that time—the latter part of the summer?

Prof. Stewart.—I don't know of any injury from cultivation, and as for the demand for moisture, I may again call attention to our results in the Wyoming County orchard this year, where tillage and cover crop increased the sticking qualities of Baldwins 52 per cent. over the mulch system.

Mr. Good.—And yet you say that tillage causes the fruit to drop.

Prof. Stewart.—No, the effect seems to be quite the reverse, the figures show this and it is not necessary to argue one way or the other. Now, as to the question as to whether tillage injures the roots of the tree. I suppose that we have some soils that are so shallow that a three-inch tillage would take up all the soil that there is for the apple roots, but orchard soils should be deeper than that if you expect the trees to grow properly. If you have soil of a proper depth, a three-inch tillage will not injure the tree. We have records from over 15,000 acres of bearing orchard in Orleans County, N. Y., and they show an increase of over 40 per cent. in favor of tillage as compared with sod systems under approximately similar care otherwise. This shows that whatever injury the roots may have sustained has not interfered with the yield, which is what we are after.

A Member.—Do your results apply to the peach as well as to the apple?

Prof. Stewart.—Of course, they cannot apply as well to the peach as to the apple, as these figures were all derived from ex-

periments with apples, but other records show that any stone fruit requires even more cultivation than the apple.

A Member.—How about commercial fertilizer for peaches; is that any benefit?

Prof. Stewart.—There is a good deal of difference of opinion about that, and little experimental evidence. However, in an orchard survey of Niagara County, N. Y., in which I had the pleasure of participating, it is found that out of about 8,000 acres of peach orchard, 80 per cent. of the orchards are receiving fertilizers of some kind, either stable manure or commercial fertilizers, or both, and these orchards are making much larger financial returns than the others. I can't give you the exact figures. I have them in my office, but they are distinctly greater where fertilizer is being used, about $20 to $45 per acre I believe, and these are five-year results, not the results of only one year.

A Member.—What fertilizer would you use—potash, or nitrogen or phosphorus, or all combined?

Prof. Stewart.—That is a question that can only be settled by actual tests in the orchard. You will notice the summary that I closed with; that summary will guide you in the use of fertilizer as well as anything I am able to tell you at this time. But there are several things you must do in connection with putting on fertilizer. You can't expect it to do the work of tillage, nor of any of the other essentials in the care of the orchard. These things must be done or your fertilizer may be thrown away. After they are done, if there is a deficiency in either wood, fruit or foliage, the chances are that an application of fertilizer will produce beneficial results. Now what fertilizers shall you use? People have always been talking phosphorus and potash for fruits and yet our greatest effects thus far are coming from nitrogen. This doesn't mean that the other elements are not needed and it may very well happen that where nitrogen is lacking, this lack must be met before any benefits can be realized from the potash and phosphates. For the present, I would recommend the use for general conditions of a fertilizer containing 30-60-100 pounds per acre of actual nitrogen, phosphoric acid and potash, respectively. To bring up the nitrogen this can be alternated with an eight to ten ton application of stable manure, and supplemented with a leguminous cover crop or a permanent cover.

The Secretary.—I should like to ask if one has an old apple orchard that has not been cultivated, if it is advisable to plow it up three inches, or less?

Prof. Stewart.—I should say that I would plow it up if it is not now producing satisfactory results.

Prof. Surface.—What depth?

Prof. Stewart.—About three or four inches; if you do cut off a great many of the old roots the effects will show increased

yield, and that is all the argument that is necessary, I should say. If the orchard is doing well, however, it would not be advisable to make any radical changes. We can over-till orchards as well as under-till them, in my opinion.

Mr. Hale.—What is the risk?

Prof. Stewart.—It aids fire-blight, for instance. And in trees just coming into bearing, our present records seem to show that it delays fruiting. In such orchards, in our experiments, the sod-mulch system shows an advantage of 30 per cent. over clean tillage.

Mr. Gossard.—Do you think that apple trees that are treated with stable manure are more subject to twig blight than those that are treated with commercial fertilizers?

Prof. Stewart.—That simply resolves itself into this, it seems to me: twig blight is caused by bacteria, which are largely transferred by insects during the blooming period and during other periods of succulent growth. The insects become inoculated by visiting the gummy masses that exude from active blight cankers on the limbs or trunks of trees, in which the bacteria pass the winter. Many twigs become inoculated in this way every year, but it is only those of succulent growth that are badly injured. Therefore, the fertilizer that does most to produce the succulent growth is the one that does most to spread the blight. Barn-yard manure as shown by the Massachusetts records, already presented, will produce a somewhat greater growth than commercial fertilizer, hence, it is likely to be a little more conducive to blight.

A Member.—I would like to know whether there is any material difference between cultivating three inches deep in an old orchard with a spring tooth harrow, or a three-inch cultivation with a plow.

Prof. Stewart.—I doubt whether you could get a three-inch cultivation with a spring-tooth harrow.

I'm afraid some of us are inclined to be too tender on these old roots, and we often fail to do things we should. I sometimes think that fear of injuring the apple roots is simply an excuse for not getting out and doing the work. I have recently made a study of costs and profits in fruit-growing. I have noticed a most interesting relation between the cost of production and net returns. Of course, you know the man who does nothing for his orchard and gets nothing back from it. In that case, the cost of production is zero, the return is zero. Up in Orleans county, N. Y., the records from the 15,000 acres of which I spoke a while ago show that the average annual cost for five years in producing and marketing the fruit is about $50 per acre, about $35 of which went into barrels, packing and so on. The average net return is $61.40 per acre. I have the figures from an orchard here in Pennsylvania, the exact figures, where $116 per acre has been put out for cost of

production and marketing, and the net returns are $274 per acre. In an Oregon orchard, where the cost of production and marketing was $380 for an acre, the net returns were $900. Notice that the higher the cost of production the higher the net returns were. We must remember that there are several essentials in fruit growing, and in order to succeed we must look after them all. The neglect of any one may reduce returns from the whole orchard.

Mr. Hale.—The orchard is simply a factory in which a man invests his capital, and the finished product must be so regulated that it will restore it to him again. Of course, we must waste money to begin with, and the returns are slow; we must plant and prune, and cultivate and fertilize. Some time ago the Atlanta Constitution sent out inquiries to the large peach growers as to what it costs to handle the growing peach in order to get the best returns—the best prices on the market, and the answers showed without a doubt that those whose cost of production was low, also got low prices; those who had the greater expense also got the greatest returns. We can't get something for nothing anywhere in this country, and the returns shown by our Experiment Stations everywhere all point one way.

The gentleman on my right asked the professor something about the feeding of his orchard. You must ask the tree some questions. The most successful orchards have been built up by men who consulted their trees and gave them what they required. Regard each tree as an individual thing, and study the local conditions attached to it, and then give it what it needs, and you will get the best results.

Prof. Surface.—It has been recently said that in tilling an old orchard for the first time it is necessary to cut back the branches so as to make them balance with the root branches. I want to ask Prof. Stewart if that is the right hypothesis.

Prof. Stewart.—I don't know that it is absolutely necessary to cut back the tree in renewing tillage in an orchard. The tillage system is going to conserve more moisture. The roots that you cut off will be quickly restored by fibrous roots, which perhaps will enable the tree to get as much moisture as necessary, so I don't believe there is any real necessity for the maintenance of that so-called balance that we have been assuming, between the top and the roots. Of course, there is probably more or less of a balance there, but I believe that the greater amount of moisture that should remain in the soil under tillage will supply the tree, even with the shortened roots, so I doubt the necessity of maintaining that balance. Of course, in an orchard that has been neglected in the matter of tillage and pruning, we will be compelled to do more or less pruning, but as to whether it is absolutely necessary to maintain this balance, I do not think it is.

Now, then, one other word: Mr. Hale takes exactly the position that I wanted to see. You can not get something for nothing, except possibly in the case of plant breeding; our plant-breeding friends would have us believe that they can increase returns without increased expense. But in regard to his factory analogy, there is a

little danger there. Because with the idea that our orchard is exactly like a factory, we have sometimes thought we could increase our returns by cutting down the cost of production. Here is where the analogy ceases. You can increase profits in factories by cutting down the cost of production, but usually this is not the case in fruit production; here, you will find it necessary to increase the cost of production rather than decrease it because we are dealing with a perishable product, but with that amendment, I am heartily in favor of Mr. Hale's experience as to cost.

The President.—Is the Auditing Committee ready to report?

Mr. W. C. Tyson, Chairman of the Auditing Committee, then read the following report, which was accepted:

"We, the undersigned, have examined the Treasurer's statement of accounts, and find the same to be correct."

(Signed)

W. C. Tyson,
J. L. Rife,
D. C. Rupp.

Mr. C. J. Tyson.—The Fruit Growers' Association of Adams County received a communication from State College recently, requesting that our exhibits here might be sent to them for use in their class work. We should be glad to accede to this if the Association is willing.

The President.—That rests with the exhibitors. The fruit is simply on exhibition here, and remains the property of the exhibitors. If you wish to send it to State College, we will try to see that the Adams County exhibit is not disturbed in any way.

Before making the announcement that we will take a recess, I want to say that the Treasurer is sitting at his table, ready to receive your dues, and that it is necessary to have your dues paid before you can receive the publications of the Society. I hope every one will take advantage of this, and pay the same.

Mr. Chester J. Tyson.—Right here is a point that has occurred to me, and that is that we do not get enough new members in these meetings; there are people who come here to our meetings, but who are backward about making themselves known. If a committee were appointed to see these people, we might be able to increase our membership considerably.

The President.—Do you make that as a motion?

Mr. Tyson.—Why, yes; I move that the Chair appoint a committee of ten to canvass and see what can be done towards increasing our membership.

This motion was properly seconded, and carried.

The President.—In addition, I would like to say that any one who is interested in Horticulture is welcome to join us; we have no

initiation; all that is necessary is to pay your dollar, and you become a member and receive the report of the Society.

If there is no further business, we will now take a recess until quarter of eight this evening.

TUESDAY, JANUARY 19, 1909, 7.45 P. M.

The session came to order with President Hiester in the Chair.

The President.—I will name the following committee of ten to secure new members: Mr. E. C. Tyson, Mr. Calvin P. Scholl, Mr. D. C. Rupp, Mr. W. C. Tyson, Mr. F. H. Fassett, Mr. W. S. Adams, Mr. J. H. Coursen, Mr. John G. Engle, Mr. A. W. Stephens, Mr. H. H. Snavely.

The Secretary took the Chair, while the President delivered his annual address.

President's Address.

Fifty years have passed with all their successes and failures since this Society was established.

For a half century a comparatively small company of men, drawn together by their common love of fruit, flowers and trees, have meet annually, to exchange views, to renew acquaintances, and add somewhat from their experience to the general fund of Horticultural knowledge.

For nearly forty years I have met with them. In viewing the present audience I look in vain for many faces that were familiar in the early days, faces of men who were respected not only on account of their horticultural knowledge, but who were loved for all those qualities of mind and heart that make good comrades. Some are in distant states, some are prevented by ill health, and many are resting from their labors, and reaping the reward of a well spent life. But while I miss the faces of those strong, good, lovable men of the early days, I see occupying their seats to-day young men, full of enthusiasm, courage and state pride, ready and able to take up the work which they have laid down, and push it with equal diligence and success.

We meet to-day to celebrate our bi-centennial anniversary. It seems to me that this is a good time to ask ourselves the question, Is it worth while? Do these meetings pay? Are we getting out of them as much as they cost?

At one of the first meetings which I ever attended, President Josiah Hoopes made use of these words in his annual address:

"We are designed to be social beings, and he who would conceal an important discovery and refuse to assist his less fortunate friend with the benefit of his experience, is an enemy to the cause and should be shunned as such. Let our lasting endeavor be to render some real lasting service to Horticulture, and by the simple act of

each individual member relating the many little items of experience that he may have gained in his daily work, receive in return the accumulated wisdom of those who have made the subject their life long study."

If during the first fifty years of its existence, this Society had done nothing more than encourage and keep alive this spirit of mutual helpfulness, this willingness to do something for the common good without special pay, it would have been worth while, it would have paid well. But it has done much more. The early members were not commercial orchardists as we accept that term to-day. Most of them kept a small orchard as a side line to general farming, and sold the product in the local market. Cold storage was unknown. Railroads had not penetrated to every nook and corner of the country, carrying tropical fruits North, Northern grown fruits South, Western fruits East, and Eastern fruits West, as they do to-day. Their object was to build up the home orchard in such a way as to furnish the owner and his local town with a good apple for every day in the year, and to prolong the season of the other fruits. So we find that these men living in many different counties planted a great many varieties in each orchard; they met together annually to discuss their merits, and exchange scions of desirable kinds. The result is that these old orchards not only contain trees of many kinds, but often single trees bearing several different varieties.

When Dr. Hunt accepted the position of Director of the Experiment Station and Dean of the School of Agriculture at State College two years ago, he came to us with the question, What can the Experiment Station do for Horticulture? After a lengthy discussion which was participated in by a goodly number of our members, it was decided that we ought to know more about the adaptability of the different varieties of fruit to the conditions existing in the various fruit sections of the State, that the time had come when we should plant in commercial orchard only such kinds as would reach their highest degree of perfection in that particular locality, and so Dr. Hunt was asked to start a fruit survey of the State under the direction of the Experiment Station for that purpose, and at the same time start a series of experiments in orchard management, including cultivation and fertilization. This work was placed in the hands of Prof. J. P. Stewart.

In making this fruit survey Prof. Stewart is greatly aided by the work of these early members. In almost every old orchard visited he finds most of the standard market sorts, and a great many others, with usually three or four kinds doing their best, so without any theorizing he is able to say "I find this variety growing in a certain locality, and succeeding admirably. You are perfectly safe in planting it." So you see these annual meetings with their exchange of views, and exchange of scions, have kept alive the interest in fruit, have furnished the preliminary tests of varieties, in all parts of the State, and under all conditions, have paved the way for the profitable planting of commercial orchards to-day, and have furnished the source from which our Experiment Station can draw much useful information in the pursuit of its investigations.

We are fortunate indeed in starting the second half of the cen-

tury to have the information that has been accumulating during the first half, and to have the interest and enthusiasm that has been encouraged and kept alive in our members by these annual meetings.

We have now reached the commercial age. The markets of the world are open to us, and here we are confronted with new conditions. In order to succeed and hold our own in the general market we must not only study varieties and methods of cultivation, but business methods generally.

Dr. Hunt in his first address before this Association said: "I do not wish to underestimate the importance of barter, but the most important element of success is the economic production of a high class article, whether it be an apple, iron or broadcloth."

I am glad to have the endorsement of so high an authority to the idea that I have been advocating for a number of years. That in our future planting, quality should be the first consideration, that in the selection of varieties, location and system of orchard management, we should always keep in view the production of fruit of highest quality. We are now just beginning to appear in the general market. If this Society by precept and example can induce the fruit growers of the State to plant and grow quality, and pack honestly, we can meet any competition that may arise, and easily place Pennsylvania at the head of fruit growing states.

It is regretable that we must have page after page of laws on our statute books relating to pure food, and an army of inspectors and detectives to enforce them, and now we have another proposed law known as the Porter Bill, which will be introduced at Washington this winter to regulate the packing, grading and marking of fruit, which in its present shape will require another large army of inspectors to enforce. In my opinion the only additional law we need is one that will define the exact size of the several packages used in the general market, and require the name of the packer to be placed thereon, and let each fruit section, and each individual, profit or lose by the manner in which the fruit is packed. Let me illustrate my point by a short article which appeared in one of our trade papers under date of October 30th, as follows:

"New York, October 30.

"At this writing Steinhardt & Kelly have received some 10 or 12 cars of Hood River apples packed under the terms of their contract with the Hood River Apple Growers' Union. The apples that have been coming along are fruit that might very aptly have been grown and plucked in the Garden of Eden itself. It would be impossible for the artist to paint prettier apples than these Hood Rivers, and the best of it all is that in the top, bottom, sides and middle of the boxes they are all the same—so much alike in color, conformation and unblemished beauty that one can not tell 'tother from which. No higher standard of packing is humanly possible and the contents of the cars already received fully bear out the statement of H. M. Huxley.

"By this magnificent kind of pack the Union is not only helping Steinhardt & Kelly to work out on a big deal in a successful manner, but it is also helping itself and the Hood River Valley beyond all words. For car after car to turn out with every apple in every

box a perfect specimen of its tribe is the biggest and best advertisement that the Hood River section could ever get."

It seems to me we do not need laws and inspectors so much to enforce business honesty among fruit growers, as we need leadership. Let each individual member of this Society make up his mind that he will be a leader in his community, and will try to induce others to follow his lead. In this way and in this only can we establish a reputation that will be proof against all competition.

You will notice in the short sentence which I quoted from Dr. Hunt's address, he referred to the *economic* production of a high class article. By economic production is not meant growing a crop with the least possible expense. It has been found that when money and labor are judiciously expended on any farm crop, the net profit will steadily increase up to a certain point. After that point has been passed, while there may be a slight additional gain from the added care and expense, it is not equal to the cost. How many of us have ever reached the limit of profitable expenditure in the care of our orchards?

We have not nearly reached the limit of economy in the production of our crops, there are a number of important questions that must be answered before we can hope to reap the maximum profit from our orchards, to answer which requires a knowledge of the great principles which underlie all plant growth, animal growth, and the chemical and physical changes that are constantly occurring in the earth itself.

Our large mining, manufacturing and railroad companies long ago began to realize the importance of having technically trained men for their work, and at last the farmer is getting his eyes opened to the importance of the subject.

The 500 farmers who met at State College during Farmers' Week about the 1st of January, and listened to the lectures, asking questions and taking notes, and discussing the last topic among themselves between times, show very clearly that they appreciate the importance of this technical knowledge.

I am glad to be able to say that at last State College is prepared to train men for this work. Dr. Hunt has gathered about him a corps of able assistants and proposes to give Pennsylvania an agricultural school unsurpassed by any in the United States.

We of course are most interested in the Horticultural side of this school. He has shown his interest in us by placing at the head of that department Prof. R. L. Watts, one of our own members, a selection that gives universal satisfaction. The amount of good this department can do us is only limited by the means furnished by the State for its support. Equipment is badly needed as the department is new. Prof. Watts must have green houses and laboratories before he can do effective work. I would suggest that our Legislative Committee take up this matter and bring all possible influence to bear upon the Legislature this winter to secure the needed equipment.

It is gratifying to see the interest which the railroad companies are taking in our welfare. As you all know the Cumberland Valley road recently placed a special train at the disposal of our Economic Zoologist for several weeks, which enabled him to visit

all the leading fruit districts in the great Cumberland Valley, and demonstrate the use of the various sprays and sprayers in a much more thorough manner than has ever been done before. I am sure the farmers appreciate the courtesy of the railroad company, and the officers of the company believe that the results will justify the expenditure.

Owing to the changed conditions under which we work, I think the time has come to change somewhat the character of our future conventions. In my opinion we should have three days sessions instead of two, and should have a hall as near the convention hall as possible for our fruit display, and for the display of all kinds of orchard supplies and equipment.

Some of our sister states have been doing this for several years, and find that it adds much to the interest and usefulness of the meetings. I mention this now so that the members can talk it over informally, and give their views to the members of the Executive Committee.

We should devote one session to market garden subjects. Notwithstanding the fact that we have exceptional advantages of soil and climate for market gardening, our neighboring states of New Jersey, Delaware and Maryland furnish nearly three-fourths of the produce sold in our local markets. As many of these crops can be grown to advantage in young orchards before the trees come to a bearing age, it is highly proper that they should be considered in connection with the cultivation of our orchards, and that we should urge our market gardners to join our Association, and work with us for the upbuilding of Pennsylvania Horticulture.

I would suggest that our Legislative Committee examine very carefully the proposed amendments to our game laws, which have been prepared by the State Sportsmen's Association, and will be presented to the Legislature for adoption this winter. It is highly important that the property rights of the farmer should be protected. We should see that no law is passed which takes from the farmer the right to protect his crops at all times from their enemies, whether in the form of beast, bird or man, and no one is so competent to determine who are his friends and who his enemies as the farmer himself.

I will now close by extending to you a very cordial invitation to our Centennial Celebration, which will be held on January 19, 1959.

The President.—I am glad to say that we have with us one of our oldest ex-members—one who needs no introduction, but whom I am glad to present to you—Prof. S. B. Heiges.

Address of Prof. Heiges.

Mr. Chairman and fellow members of the State Horticultural Association:

I little expected when I left the mild climate of Virginia that I should be honored by being presented to you as the oldest member of the Association. I feel as if I were the youngest man standing among you.

It certainly affords me great pleasure to be with you once more. I have come for two purposes—for the purpose of seeing again the older members of the Association, with whom I have met in earlier years, and also for the purpose of looking into the faces of the younger members who have taken up the fight. It is with a feeling of great pleasure, and also of great sorrow that I appear before you to-night. My heart would be a heart of ice or adamant if it did not respond promptly to the old, warm hand-shakes, and the warm greetings that I received here this afternoon. Many of the older members have gone over to the other side. The Bard of Avon puts into the mouth of Mark Anthony at the bier of Julius Cæsar the words: "The evil that men do lives after them; the good is oft interred with their bones;" but of these older members who have departed, I have known nothing but good. There is no class of men more honest, more honorable, more truthful than fruit growers. The very nature of their occupation makes them so.

I have not come here with any set speech; I have merely come to take you by the hand, those of you who are my old friends, and to meet the new ones but I want to recall to your memory some of the older friends and members who have passed away. If I have omitted any, it is simply because my time has been too brief to do more than glance over the history of the Association since its organization.

The first meeting of this Association was held in the city of Lancaster half a century ago; I was not present, but I had the pleasure afterwards of meeting the first president, Dr. Eshleman. A truer, more genuine, better man never lived. He was followed by Mr. A. W. Harrison, of Philadelphia, a man whom I knew well. The third president of the Association was Mr. R. A. Grider, of Bethlehem. I have taxed my memory over and over, but cannot recall that I ever met him. The president for 1862 not only served faithfully, but he lectured on potato culture in various parts of the State.

The fifth president of the Association, whom I had the pleasure of meeting, was Dr. James Calder, of Harrisburg, at one time president of the Agricultural College of Pennsylvania. A more genial, honorable and upright man, and a better husband and friend never lived. The three or four years I was a member of the State Board of Agriculture, I lectured with him at Farmers' Institutes. Earnest, honest, truthful, his influence made itself felt in whatever he undertook.

The next president of the Asosciation was D. W. Gross of Harrisburg, a druggist, and horticulturist, who had personal control of a small vineyard a few miles from home. I have nothing but good to say of him.

Dr. James Calder was again elected president in 1868, and after him followed Josiah Hoopes of West Chester, who wrote one of our most valuable horticultural books, "Evergreens of America." For reasons known only to himself, he declined to serve after being elected, and his position was filled by the vice-president, Mr. H. M. Engle. Of the years 1874 and 1875 I shall not speak. The president was from the county of York.

In 1876 Mr. Edwin Satterthwaite was elected president. He

was an extensive pear grower, and long before the experts at Washington discovered how the pear blight was carried from one tree to another, he gave us his experience, showing the influence of the distribution of pollen. Dr. Waite, of the Department of Agriculture, made some of the most valuable discoveries in horticulture, but Mr. Satterthwaite had, unknown to Waite, anticipated these discoveries several years before they were announced by the Department of Agriculture.

After the years 1877 and 1878, during which Mr. Josiah Hoopes was again elected president, Mr. Henry M. Engle, the first vice-president, served during 1879. He was from Lancaster county, and an upright, honorable, genial man; a cultivator of the Paragon chestnut, which he introduced to the horticultural world.

As Pomologist of the Department of Agriculture, during the second administration of Cleveland, I was able to introduce this chestnut into Virginia. There were no native chestnut trees in certain sections on which to graft them, but Charles Baltet, of Troyes, France, one of the most eminent horticulturists of the last century, suggested grafting them on the oak, and particularly the red oak; we issued a small bulletin, and sent scions throughout Virginia, and I am pleased to say, we were unusually successful.

To-day I received from the family of Charles Baltet the announcement of his death, in which are the names of his wife and his sons and daughters, his grandchildren, his brothers and brothers-in-law, his nephews and nieces and his cousins and cousins-in-law, together with the societies of which he was a member: he was recognized in this country, and in Europe, where he was known by his writings, as one of the most honorable and honest men, as well as one of the most eminent horticulturalists.

From 1880 to 1884 this society honored by the presidency the Hon. George D. Stitzel, of Reading, an honest, earnest man. From 1885 to 1888 he was succeeded by Calvin Cooper, to whom I am largely indebted for being called to the position of Pomologist of the Department of Agriculture. At the meeting of the State Board at Bethlehem, he was the member from Lancaster county, and Governor Pattison the presiding officer. Mr. Cooper rose and offered a resolution recommending my appointment to the position of Pomologist of the Department of Agriculture. It was the happiest moment of my life, when, after the reading of this resolution it was unanimously adopted. Governor Pattison requested Secretary Edge that this resolution be sent to the Hon. J. Sterling Morton, Secretary of the Department of Agriculture, with his strong personal endorsement. My appointment hung fire for five months. My assistant, Mr. Taylor, afterwards told me that Mr. Morton had told him he had so many applicants for the position that he was in a quandry whom to appoint. He sent for Mr. Taylor to come over to his office one day, and directed him to write to Thomas Meehan, regarding my qualifications. He was just about to write, when he again received a message from Mr. Morton, saying he need not write, that he had received a letter from Mr. Meehan, and I was appointed. I wish I could tell you, ladies and gentlemen, of the little good I was able to accomplish during the four years that I held the position. As I have already said, I was instrumental in

introducing the Paragon chestnut into Virginia, and with the assistance of the Minister to China, Mr. Denby, I introduced the cultivation of the Chinese persimmon in this country. After bringing great pressure to bear on the Chinese, Mr. Denby was finally able to secure some scions. I instructed that the ends should be covered with paraffine, and covered with finely powdered charcoal, and sent to us. Upon opening the tin cases, I found that the charcoal, instead of being finely powdered was about the size of a hazlenut, or even an English walnut. The following year we got Mr. Denby to send us another lot. This time they came in the same style. Mr. Denby, however, sent a lot of seeds from choice specimens that he had bought. These seeds were propagated and we sent the trees to several different states, chiefly California and Florida, and from these seeds we have cultivated this persimmon in this country. Again, my predecessor, Prof. Van Deman, had wisely tried to secure from Sicily scions of citron trees. They are very jealous of their fruits over there, and guard them carefully. Instead of sending citron scions they sent the three varieties of their most worthless lemons. Of course this fraud was detected when fruit was produced in California and, perhaps, in Florida.

Application having been made to me for scions of the true citron, Secretary Morton directed me to obtain them through Prof. Fairchild, who was in Europe studying the diseases of the coffee tree in order to take charge of the coffee industry for the Dutch Government in Java.

We also conducted a series of experiments in different methods of root grafting, at the suggestion of Secretary Morton, who was a strong advocate of "whole-root" grafting. Selecting a dozen or more of the varieties in general cultivation in the apple-growing states, several hundred scions of these varieties were grafted on whole roots, an equal number on the upper half, and an equal number on the lower half of the seedling roots. These were all cultivated precisely alike and at the end of the first growing season an equal number of each method was taken up, calipered, measured as to height, and root development compared. No perceptible difference in the different methods could be discovered.

The second season all the trees were cultivated alike and at its end the trees were subjected to the same test as the former years, with no perceptible difference of growth in either method. A complete set of these varieties, grafted by the three different methods was sent to the Experiment Stations of all the apple-growing states with the request that they be planted, cultivated in similar manner and to carefully note; difference of growth, vitality, time of fruitage and productiveness.

Of course years will be required to answer all of these questions in such a manner as to benefit the nurseryman and orchardist.

Mr. H. C. Snavely, whom I had the pleasure of meeting here this afternoon, succeeded Mr. Cooper, and served during 1889 and 1890. He is one of the most successful growers of small fruits and peaches in this section of the State.

Next came Mr. Moon, and there is no slander in saying that in appearance and in fact, he was a full moon.

I again was honored by election to the presidency from 1897 to

1899, and from 1900 to 1904, H. A. Chase, of Philadelphia, served as president—one of the most successful orchardists in the State of Pennsylvania. From 1904 to 1908 your most worthy chairman has filled this position. I have not only known him as president of this society, but it has been my pleasure to have been with him at Farmers' Institutes, and he has been an honorable and faithful laborer in that capacity.

This is the brief list of the gentlemen who have served as president. We have, however, with us this evening, a gentleman who for many years acted as treasurer—Mr. J. Hibbard Bartram, whom I have not seen for many years.

Of the members who have died, there is one who was to me as a brother—Hiram Engle of Marietta. Now, of these soldiers who have died, I wish I had the time to make up a list. Standing at the head of the list was that honorable, upright, genial man, Brother Sisson, whose heart was so pure and whose hands so clean that he could stand up and tell a story for which I would have been hissed from off the platform, and whom the State honored by having his portrait in one of its reports. I was with him at Somerset when he met with his accident. I was at another hotel, but I went to see him, and he said to me, "Brother Heiges, I have fought a good fight, and my time has come." I have come here for the purpose of telling his story and that of the other leaders, to these younger members of this society, on whom will soon fall the burden of leadership, so that they may know what the old soldiers have done.

One of the first members from my own county was Jacob Cocklin, a noble, honorable gentleman; his son is here to-day. Then there was the Hon. Gerard C. Brown; and another known to the older members of this Society—Peter Lint, who surprised us by always having a basket of fine Maiden Blush apples on exhibition in January—fine and firm, and free from specks. He called upon me a few months before his death. He said, "I will never meet the Pennsylvania Fruit Growers' Society again, so I'l tell you the secret of the Maiden Blush apples; I always selected the largest, and finest specimens, and put them in a basket, which I hung by a strong twine in the well, just about two feet above the water"—a process of cold storage, ante-dating the cold storage as we use it to-day. Then, I must not forget that clean Quaker, Edward Jessup, a son of Jonathan Jessup, who came up from North Carolina; he was fruit-grower, carpenter, blacksmith, engineer and everything else, and proved successful in everything he undertook. He disseminated the York Imperial. During my residence in Washington, two other states claimed to be the originator of this valuable apple, and one man wrote me from New York that its very name proved it to have originated in New York—"*York* Imperial." Another man wrote me from the South, saying it had been discovered there and known as "Johnston's Fine Keeper"—spelling Johnston with the "T." But that it was due to Jonathan Jessup that this fruit was disseminated, I know, because I have seen the letter written to him, now yellow with age, by Andrew Jackson Downing, brother of Charles Downing, one of the greatest horticulturists this country ever produced. He laid out the grounds of the Smithsonian Institute, and lost his

life in a steamship accident during the time of President Tyler; this letter read as follows: "Friend Jessup.—I have received thy basket of very fine apples; it is the Imperial of late keepers, and very fine, and as thee says it originated near York, Pennsylvania, I would suggest the name of York Imperial."

"Thy friend,
Andrew Jackson Downing."

It received its name in the first place from Mr. Jessup as "Johnson's Fine Winter," owing to the fact that it was found first on the grounds of Mr. Johnson near the banks of the Codorus. The tree grew along the highway and it was noticed that market-men as they passed by, and school children got most of the fruit; there did not seem to be much appreciation of it by the owner. Mr. Jessup undertook to cultivate it, and introduced it as "Johnson's Fine Winter." The trees could not be sold, and to get rid of them Mr. Jessup took them out to a gully along the highway leading from York to Baltimore and strewed them there. Then the shrewd, economical Pennsylvania Dutchmen picked them up and planted them. Mr. Jessup said: "They will not plant anything else; I'm glad they will plant these." That is why the county of York is the home, and the great producer of the York Imperial.

Then, I must not forget that fine tenor singer, Mr. Mercereau. He was an Englishman, who came to this country as a member of Madame Seguin's English Opera Troupe; that was before the days when Grand Opera was popular, and the company soon disbanded, and Mr. Mercereau began the cultivation of fruit at Catawissa, where he was very successful, and introduced a very fine strawberry, called after the English statesman, Gladstone.

If I had time, I could talk to you for a long time of the older members of this society. Younger members, you have before you the example of some of the finest and most noble men, and I want to say to you that I have never known fruit growers to be anything but honorable, honest, upright men, from Maine to California, and from Washington to the Mississippi Valley, I have never known one of them to do a mean, contemptible, dishonorable thing. (Applause). Keep on; be courageous, be honest, be energetic, be industrious, be honorable, be just, and don't be afraid of work. Work is a blessing that God has conferred upon us. Work is not a curse. There was no curse imposed on us for the sins of our first parents. Man was not cursed. The Bible says "cursed is the earth"—not man—but "cursed is the earth, for thy sake."

I leave you with the promise that I hope to see you ten years hence, when some of you younger men shall have gray hair, with the thought, and with the prayer:

When comes the evening tide,
When Life's Saturday is gone,
We'll cast our working dress aside
And put our Sabbath garments on.

Mr. Good.—I am acquainted with the gentleman who has just spoken for a number of years, and was very much interested in his

talk—particularly in his personal talk, and his reference to the persimmon. I wonder whether he is responsible for the "simmons beer" that was used as a 'possum chaser for the 'possum and "sweet 'taters" that they have been feasting Mr. Taft on down there in the South?

The President.—We have with us one of our older members and former presidents, Mr. Howard A. Chase, from whom we shall be glad to hear at this point.

Mr. Chase.—I appreciate this invitation to speak to you to-night. Mr. Heiges has referred to many of our older members. I shuold like to refer briefly to a few more who were leaders with us, but now meet with us no more,—such men as Thomas Meehan, William Parry and one or two others. These men met with us at Williamsport; it was a meeting long to be remembered. These men, men rich in experience, rich in thought, made our meetings both pleasant and profitable. Year after year it was my privilege to meet with them and with others whose names I cannot now recall, at the various meetings throughout the State. Much have I learned, much have I yet to learn in horticultural matters, but when I look here to-night at this fine display of fruit, I think you will agree with me that it is not a matter of great surprise that at the Paris Exhibition the fruit grown in Pennsylvania won the first prize for excellence, for some forty-six varieties exhibited and what was done there, is done here. While in point of size, perhaps, or beauty of finish, our apples cannot reach the standard of those raised on the Pacific coast, when it comes to quality, our Pennsylvania apples are far superior to them. But, gentlemen, this is the material side of our work. No man on this floor here realizes more than I do the importance of Pennsylvania's being and becoming one of the great fruit growing states of the Union.

But, gentlemen, let us consider for a moment the ornamental side of our work. I realize that, working as we do, and keeping at it daily, we have an excuse for not paying more attention to the ornamental side, but let us pay a little more attention to our yards, and our lawns. We need not purchase expensive shrubs. Right here in Pennsylvania, out in our woods, and on our hillsides, we can find as fine shrubs and plants as any one could wish, with which to ornament our lawns. So let us consider this feature. Two years ago I went up to the mountains for a few days rest, and during the few days I was there I was busy taking up shrubs in the woods, and carrying them down to the little yard and planting them. To-day people stop and look at that little garden, and ask where these beautiful shrubs came from, and are surprised to learn that they came from the hills around them.

Ladies and gentlemen, when I came here to-night, I did not expect to say a word, but I am glad of this opportunity to say a word about those brother members who have gone; if it were left to me to write the epitaph of every brother who has gone over the "Great Divide," I might truthfully say that he was faithful to his God, to his country, and to his fellow-men.

The President.—Now, Mr. Hale is going to tell us some of the things we are up against. Mr. Hale has learned how to push away most of the things that bother us, and we want to learn how to do it, too.

THINGS WE ARE UP AGAINST.

By J. H. Hale.

Mr. President I did not intend telling stories this evening, but when the good brother complimented Brother Heiges about the persimmon, and talked about the 'simmons beer, it was rather a dangerous subject for one who has just come up from Georgia. It reminded me of the colored brother addicted to gambling; he was playing his favorite game with some of the other colored gentlemen, and when he found he was losing pretty steadily, he said, "Let's us give up what we has been a doin' and name what is good eatin', and the fellow what names the best gets the pile." The others agreed, and then they started, each one taking a turn, until it came about the fourth man; he said, "Well, dar's 'possum, and dar's sweet 'taters, and dar's watermelon, and dar's 'simmons beer," and then they set up a howl "for sure, dat niggah done named all de good things dar is to eat." So it is with these gentlemen; they have done said all the good things, until there is but little left for me to say.

Yesterday I met a horticultural friend of mine, and I told him they had asked me to come over here and talk about the things we are up against, and I hardly knew what to say; I asked him what was the chief thing the horticulturist was up against, and he said: "He is up against himself more than anything else," and I said, "Amen." I think we are up against ourselves as the most serious proposition to be worked out, and that reminds me of another story. A young bride who had recently been married was congratulated by all her friends on having a model husband. She felt very good over this until she went home and looked in the dictionary for the definition of "model," and found it meant "a small imitation of the real thing," and that is the real proposition. We are up against model orchards.

One of the things that the average orchardist is up against is too many varieties. The old stager who has been through the mill, and then out of it, and the business man who starts out to go through the mill all make this mistake. One of the most successful agricultural teachers I ever knew turned his attention to orcharding the past few years, and against his own knowledge, and the advice of his friends, planted three times as many varieties as he should. In commercial orcharding keep the number of varieties down to a very few of the best for your location.

Another thing we are up against is the advice of our friends. Then the nurseries give us mixed varieties; and there are so many

old favorites that we would like to have that the nursery gets in some very good work, and nine times out of ten, between the advice of your friends, and the wiles of the nurseryman, you plant twice as many varieties as you should.

Then there is another consideration. Nearly always our trees come to us in poor condition, due to cheap packing and bad handling by the railroad company, and then we sit down and write the nurseryman that his trees are bad. Yet no doubt they were first class trees when he shipped them, and yet often reach you all dried up, and with apparently no life. Instead of sitting down and writing to the nurseryman—it will do no good anyway; the next lot will be just as bad—bury the trees in a moist, cool, shady place for a few days, give them the moisture they need, then in a week dig up and plant and tend carefully, and 95 per cent. will probably grow. One of my best pear trees lay root up in the sun for eight or ten days; I buried it for a week, and then took it up and planted it, and there it is standing, as fine a tree as you want to see. So don't worry every time you get a dried-out nursery tree. Don't cuss out the nurseryman too much. Nine times out of ten it will not accomplish your purpose, while intelligent handling will bring results.

Then, we are up against small fields, and unsuitable locations. It pleases me to hear you people laud the high quality of Pennsylvania apples; it is the same thing with Vermont and Michigan, and everywhere else. Each man believes he has the best fruit right there in his native state. That is a good indication; in order to succeed you have got to believe in yourself. In order to succeed best you will probably have to work right near where you were born. There are some good things farther on, sometimes, and when you get there, they are just a little farther on, and a little farther on again, and so you could go on until you land in the Pacific Ocean, but nine times out of ten you will find the best place right within ten miles from where you were born. Of course, you are having a pretty hard time, especially if you take hold of the old farm and try to make something out of it, but you *must* win out if you work hard with your brains and try to fit yourself into your surroundings. I saw an advertisement the other day for a man to undertake the sale of a wonderful patent medicine, warranted to be profitable to the undertaker, and I want to assure you, young men, and old men, widows and old maids, and the whole of you, that if you undertake to follow the ways of this society, it will work along the same lines. It is not all honey, and it is not all vinegar. There is a wonderful lot of pleasure in fruit culture—in finding and overcoming the obstacle in the way. I find successful horticulturists all over America, and they are not the ones who started on Easy Street; they are the men who started out determined to succeed and even under adverse conditions they did succeed; they know there is something in the soil that can be brought out, and they undertake to bring it out, and they succeed, with whatever branch of horticulture they undertake.

There comes the question of "how far apart shall I plant my trees?" I always say that is a local question; one man will tell you so far, and another, another distance, and so on, but to me it resolves itself into a local question. All my life I have been growing

peaches, but lately for the last 10 or 12 years I have been planting apple trees to keep me when I get old and lazy. I am afraid the trouble with most of us is that we get lazy before we get old. I started to plant one peach orchard on light thin land, twelve feet apart, but by some carelessness, we got an eleven foot pole, and before we found it out the trees had been growing two months. It has been discussed by horticulturists, and cussed by drivers who had to drive the teams with plows and harrows through it. A correspondent in Canada who had heard of this close planting, finally decided he would make a visit to the States, don't you know, for the purpose of seeing this orchard; he told me he had followed my example, only had gone farther and planted his apples 32 ft. apart, and then between them he had planted the peaches 16 ft. apart, and between the peaches, plums 8 ft. by 8 ft., and then he said, "What do you think about it?" I said, "I think you are a damn fool." "W-what?" he said, horrified; "why, I made a trip to the States, don't you know, for the purpose of seeing you and Prof. Bailey, don't you know"—Bailey of Cornell; in view of what he said to the Englishman, I think he is a pretty good fellow. From my place the Englishman went up to see Prof. Bailey, and he told him the same thing about close planting that he had told me, and that I had said he was a damn fool; "Now, what do you think of that?" he asked Prof. Bailey. Bailey said, "Why, Hale is generally right." Now, of course, you can understand why I love Bailey. It took that blessed Englishman a year to get that through his head, and then he saw the point and laughed, and wrote me a jolly good letter and I suppose he is laughing yet. These interplanting problems cannot be worked out in any scientific manner, by theory; it means just plain every day hard work, observation, and adapting yourselves largely to local conditions, varieties, etc., which reminds me of the story of the two scientific gentlemen who went hunting one summer in the Rocky Mountains, camping out; finally one night they came upon the shack of a hunter, who agreed to take them in for the night, and give them something to eat. In the corner of the one room there stood a large stove, standing about 8 ft. from the bottom on stakes. The hunter was out, and the two scientific gentlemen began to discuss the reason for putting the stove up in that manner; one of them finally came to the scientific conclusion that it was put up so high, because heat always rose first and the quicker he could get it up there at the ceiling, the quicker it would naturally fall again, and distribute itself through the room and so get most heat at least cost. The other had another scientific explanation, equally plausible, and each thinking he was right, they made a wager on the subject. They decided to ask the hunter, so when he came in, they said to him, "you have a nice warm room here, but now tell us, why do you set your stove up that way?" "Oh," he said, "I put it up that way because I lost a piece of pipe when I crossed the river, and had to put it up that way or not at all." That is just the way with the orchard; theory and practice do not always agree. I was glad to hear the report of that Professor—by the way you have so many professors here that I am beginning to wonder whether you have any real, everyday practical men—I mean orchardists—that he had from different sections of the state, showing a tendency

to thin out the apples, when half grown, just as we do peaches and plums to secure better fruit. That shows decided progress over five or ten years ago. But we must be making progress all the time. We are spreading out more in all orchard matters, and we must keep up with our progress by improved methods in every branch of our work.

Here comes the question, how shall we get the heads of the old trees down where we can properly spray and thin the fruit? That is the question, how to cut the old high headed trees down so we can get at them and how to spray so as to get the best results. Matters of this kind were not discussed ten years ago, but we will have to do it from now on, and we will do it. Most of the old trees stand twenty, thirty, forty feet in the air, and at least one-half the top must come off. A few of the nurserymen are beginning to adopt the method of lower headed nursery trees, following the hints from the growers who will have them. If you cannot get the lower headed trees from your nurserymen, get yearling whips, and make your head where you want it. We cannot any longer afford to climb ladders to get our fruit. For the outside of the tree a short ladder may be used, but the best way is to try and grow our orchards so low headed that we can do away with ladders altogether. I have in Georgia considerable of a peach orchard; it covers a thousand acres, and we sometimes gather more than two hundred carloads in five weeks, and nary a step-ladder, or any other kind of a ladder have we used in that orchard, and I don't propose to use any in my orchard in Connecticut.

Then comes pruning. The gentleman this afternoon spoke of turning up the roots of the trees, by plowing, but made a discrimination between the peach and the apple. That is just the point; there must be some discrimination between pruning and the old promiscuous slashing, once in four or five years will not do for the modern orchard. A little bit at a time, is the way to prune. There is no hard and fast rule but the way that will let the sunlight and air in is the best way. I use a good many Italians on my place in Connecticut. They are natural tree pruners, and once I give them an idea of what is wanted I get good results.

The question of culture comes next. Now, the question is a very important one, whether culture of the mind of the orchardist, or the land in which his orchard is planted. We want thorough preparation before planting. We must not only have good top plowing, but we must have a sub-soiling if it is anything except gravelly or light sand. We want as thorough preparation of land for the new orchard as we want for the garden, and when the trees are once growing, we want thorough cultivation early in the spring of each and every year. That is where we often fall down. Most farmers have so much else to do in the spring that the orchard must often wait until the last. We lose a great deal of the very best wood growth by neglecting early culture. We in Connecticut are about the same latitude as you in Pennsylvania—probably a little farther North, but if I can have only one good cultivation in a season, I want that from the middle of April to the middle of May. I used to talk a great deal about keeping orchards clean in fruiting time, but I would rather see the orchard clean during the first

growing month of spring than during the last two or three months of the season. If possible, by all means cultivate frequently the first three spring months with a cover crop on the land through late summer and fall. The question of what manner of culture must depend largely upon the soil, the trees, and your own opportunity; the implements do not so much matter; anything that will keep the land well broken up will do, particularly during the early part of the season, though of course the best modern implements are to be preferred. So many of us grow cover crops of crimson clover—one of your advantages with it here in Pennsylvania is that it often winter kills. If it continues to grow, and comes up nice in the spring, you are tempted to leave it for another week, and then it looks good again. and you decide to leave it for another week, and then it begins to bloom and it looks so pretty that you want to get your wife or your sweetheart out to see it, and she admires it so that she has two or three friends to whom she wants to show it, and so you have it pumping the moisture out of the land. Never mind what happens in the spring; you want to get cultivation early, and a cover crop put on in August if possible, and anything that tends to interfere with your early cultivation in the spring is a temptation of the devil. Early cultivation is necessary for a good, vigorous growth of the orchard.

Now, about the feeding of your orchards. It has been discussed here this afternoon, and the papers have discussed it, but it seems to me that the tree itself will tell the observing orchardist what it needs better than any one else can. The successful orchardist will prune well, and feed well, and cultivate well, in order to bring about the highest degree of fruit development; 30 of nitrogen, 60 of phosphorous, and 100 of potash per acre, is the proportion usually used, but I would say this was just a little bit stingy to your trees. I believe I would pretty near double that if I could borrow the money, and some of you are so good-looking that I would not hesitate to borrow money of you. I have in years gone by borrowed money to buy fertilizers—hundreds and thousands of dollars, because I could not afford not to do so. If you have more trees than you think you can afford to feed liberally, cut down half of them and feed them that are left full rations. Commercial fertilizers produce the best results. We have been talking for some years—especially the scientific fellows—that peach trees did not need nitrogen, but it is well to keep some nitrates on hand, and feed it to your orchards when foliage growth tells you its needed. I would not apply nitrates after July, but during May or June I would watch each individual tree, and any that were not quite as green as I should like I would give a little nitrate. I never buy a mixed fertilizer; the dealer figures that $10 worth of nitrates, $10 worth of phosphorous, and $10 worth of potash, and says three times ten is forty. I do not believe in feeding his pocketbook quite so liberally as that, at the same time I feed my trees all they will take up; 1,200 to 1,500 pounds ground bone, 400 to 500 pounds of muriate of potash, and 200 pounds of nitrate of soda per acre annually, it pays me to use. You want that tree to make a good return to you, so feed it well; don't be stingy with it; and, after all, it is "the other fellow" who pays the bills in the long run. You simply advance it;

and the more you intelligently spend on it, the more you will get back later on.

Another thing we are up against is the San Jose Scale. I got nearly mobbed in Western New York a few years ago for saying that I believed it was a blessing. But I think it has caused many of us to wake up. We were too much in the habit of letting our orchards alone, and it came along, and made us look after our orchards, or lose them. Thousands of orchards got no attention whatever until the time of fruiting came, when they went in to pick the fruit, but the scale made it necessary to give them at least some attention. The little boy upon being asked whether he knew the difference between the quick and the dead, said "Yes; those who got out of the way of the automobiles were the quick; those who didn't were the dead." So it is with the San Jose Scale; if we are not quick to look after it, our trees will be dead; while fighting the scale, which we must or lose our orchards, we have also learned to feed and prune and cultivate our orchards a little better, and they are showing their gratitude for the attention. Thousands of trees died during the earlier years of the scale, but we have become better acquainted with it, and have learned how to control it, so that instead of a curse, it has proven to be a blessing in disguise. It has made us acquainted with our trees, and when you become acquainted with a good thing, you usually learn to love it. When you become better acquainted with people, you love them better. The meanest "critter" you have in your neighborhood—I hope you haven't many of these, but you will find some in almost every other community—has some good traits, if you come to study them, and you must love them for these traits while forgetting all others as much as you can. I had occasion, not so long ago, to drive up the mountain, to see an orchard, so I hitched up old Blossom and started out. Half way up the mountain, we came across the biggest and the meanest looking dog I ever saw; Blossom hesitated, and I didn't like his looks, but there was nothing to do, but to face him; so I urged Blossom on, and said to the dog, "Why, good morning, doggy; this is a pleasant morning for you and me to be taking a trip up the mountain," and that dog looked brighter and better for the kind word. I don't know how much better he really was, but he looked better just for those few kind words. I like good and sweet things —most men do—men, women, dogs, flowers, anything that is good and true, and its all about if we but open our eyes. So in this matter of the San Jose Scale; it forces us to inspect every individual tree, and become acquainted with it, and as we become acquainted with it, we become attached to it and want to care for and improve it in every way possible. Any spray that we use to kill scale, either lime and sulphur, or anything else, but especially with the lime and sulphur, we also get rid of the fungous growths, and get better and more healthful trees, so the scale is a benefit to us after all, and if we don't profit by it, I hope we will get something—shall I say worse?—no, better than the San Jose Scale to stimulate us to do our full duty by our trees. Of course, we have the codling moth and the other moths and growths, but in fighting the scale, you fight them, too and to see their effects, you have to go to market and see the fruit offered there. We go to market, and see some re-

markable fruit offered there and then we go home, and look over our own fruit to see whether it is as good as it ought to be. The unnameable apple that we spoke of this afternoon sells because it looks well, and shows up beautifully. The people of this country are becoming more and more inclined to buy beautiful things. They are beginning to go to market with a few dollars to buy their supplies and to set aside ten cents or a quarter of that for something wherewith to decorate their tables, and feed their sense of beauty, and they are finding that they get the same benefit from $1.75 worth of food, and 25 cents worth of beautiful fruits and flowers as they would get from $2 worth of "grub." Now, beautiful fruits on the table are just as attractive as beautiful flowers, and if our fruit growers will just realize that if they grow beautiful as well as good fruits they will not only send actual food into the homes of the consumers, but something that will appeal to their sense of the beautiful as well.

Then we have the trouble of winter and spring freezings following warm weather; you can overcome that in a measure by selecting your hillsides and hill tops for your orchards, where the temperature is from five to eight degrees higher than it is in the lowlands in times of greatest drop in temperature. This question of extreme frost is one of the most serious things we are up against. These frosts come upon us from year to year, often at the time the buds are pretty well swollen, and often do serious damage. Those of you who have a hillside orchard are more fortunately situated with regard to frost than those whose orchards are down in the valley. For the man in the valley, the best thing he can do is to see that his tree is in a good, healthy condition, protected by a good, healthy cover crop; it will stand more freezing than where ground is not covered. The cover crop will help to keep back the buds, and in this way be some slight protection against freezing. The question of spring frosts at blooming time is to my mind one of the most serious general propositions we are up against in the central states in latitude of Pennsylvania and a little South, and the worst of it is, we have it regularly. Like the widower who was about to be married the fourth time to a widow and sent word to his friends to come to the wedding, it was not going to be an amateur performance, this spring frost matter is not an amateur performance but a regular thing; it comes with distressing regularity, and the only thing we can do to guard against it is to select our location very carefully, propogate good, healthy wood, spray, cultivate and use cover crops. A singular thing about it is, that it may freeze all the trees in your orchard, while half a mile up or down the road your neighbors' orchard remains unscathed. I have known this to happen in my own immediate neighborhood, 50 feet extra elevation often saving the crop.

Then, we have the question of proper thinning. We can add greatly to the production of finer fruit by thinning at the right time. This can be done by a certain amount of pruning at the proper time. I have a friend who grows only one quarter acre of plum trees, but he thins them, and he gets more from his quarter acre than the average man gets from his whole acre; he gets at least fifty per cent. more fruit from his trees than his neighbors do, and it is of much

greater size and beauty. I know a man who has half an acre of strawberries, which are regularly thinned, and makes money by the thinning. We will all get up to these things by and by, and make money by so doing. The orchardist who grows apples and plums and pears and peaches and does not thin them is making just as much of a mistake as the man who does not till his land every year. Thinning has as much to do with fine fruit as spraying has. That is why I rejoiced when I heard your chairman of the General Fruit Committee report eight or ten of his correspondents advocate thinning their apples. I have heard men say, "It costs too much;" it does cost something, but you are simply advancing the money, and will get it all back in the higher prices you can get for your improved fruit. Beginning early in the summer, the same as with your spraying, thin out your apples and peaches, and the result will surprise you. In time, this will be the general practice, but we must educate the orchardist up to it. It is like the man who saw in the paper an advertisement to send a dollar and learn how to cure his horse from slobbering. He sent the dollar, and got back the advice, "Teach him to spit." That is education of a kind at least. The fruit grower must be educated up to his fruit; he is slobbering all over the market with fruit that is not up to the standard of what it should be because he does not do the things he must do, and one of these is to thin his fruit. He thins for good peaches now, and in 10 years from now he will be thinning his other fruit, or be beaten in the market by those who do. Those of you who thin your apples, raise your hands (two hands raised). Perhaps next year there will be at least three. Now then, how many of you thin your peaches? Raise your hands. Ah! that's better; I see quite a number of hands up. You have been more used to thinning peaches, but this idea of thinning apples is a comparatively new one. Now, another question. We pick our tomatoes as they get ripe; how many of you pick your apples the same way? Our peaches are picked as they ripen, but how about our apples? How many of you pick your apples at two or more picks when they get ripe, and how many of you pick your apples when they are matured? Raise your hands. I see five hands up. How many times do you pick them? Three—four—five—sometimes half a dozen times. That's good. I have seen in Western New York the wonderful apple orchards you have all heard about, but they don't pick the Baldwin's until one-fourth or more of them are on the ground. And then they pick the matured ones and the immature ones all at once.

Now, as to apple packing. In New York yesterday I heard a consumer ask the dealer whether the apples in a certain barrel were the same all the way through; on the top they looked fine. The dealer declared he would guarantee nothing except what was on the top; he said, "I don't know whether they are good apples, bad apples, or any kind of apples; all I can guarantee is what I see on the top." We will have to change our way of packing apples, as well as of picking apples; we will have to pick them as they mature, and then grade them and pack them uniformly and when we have secured the confidence of the dealer in our method of doing this, there will be no trouble about the price. We have got to get over this idea of picking up our mature and immature apples all at once

and shipping them in the market without uniformity. They should be properly graded, and packed in such a way as to attract attention, with not a single specked or unattractive apple among them. Of course, I am speaking now of gilt edge fruit. Make the consumer want your product, and he will pay for it. You are, if it costs extra to do all these things, just remember, you are simply advancing the money it takes to do it. The consumer will gladly pay the whole bill and a good big profit on top.

We used to take the best fruit and put it on the top, but the business proposition has changed, and we have got to have the same kind of fruit all the way through each and every package. You don't suppose that this beautiful fruit that comes from the West looks the same here as it does when it comes from the tree? Not a bit of it. They were careful to select it, shipping only the perfect specimens, and to wrap every single specimen by hand very carefully. Most of this work is done by women—that is, the wrapping. And by the way, if you want honest and careful grading, take women and girls to do this work. Let the men do the heavy work —picking, rolling the barrels, handling boxes and baskets, and taking them to market, but when it comes to grading let the women do it. They are more honest than the men, and they have a quicker eye, and a quicker perception. I don't know that they deserve any credit for that; they were simply made so, and cannot help it; they can't be otherwise, and I'm glad of it. If you live near enough to the market to do so, and can haul the fruit to market; your fruit will fare better. If you cannot do this, and must depend on the express companies, you will find that even your best fruit is likely to suffer at their hands. In shipping by express we are up against a serious proposition. They are in position to do as they please in regard to handling and promptness, and the fruit growers are simply at their mercy. Whether this organization, and the other organizations combined can bring any pressure to bear on them, I don't know, but it is a serious, serious proposition. We have found it not only cheaper, but safer to ship by freight whenever possible. If you can get enough fruit together to take a car you will have a better chance to get your fruit into market in better time and condition than any other way, and the cost will be considerably less.

I used to think that we had a pretty serious proposition in the commission man; that he was simply trying to take advantage of the fruit grower but a better acquaintance with the men in this line of business has convinced me that the average commission man is a little squarer man than the average fruit grower. That is, of course, in my own state, and some others. Here in Pennsylvania it may be different. You are all honest and square, and it is the commission men and the express companies that do the juggling. But the commission man has to work just as hard for his living as you and I have to. Look up your commission man, get acquainted with him, and get him to come up to your orchard, show him your way of handling fruit, show him that you are doing honest and careful grading, that you are reliable, and he will go back, and begin to advertise your fruit. When you begin to pick your fruit, ask him to send down a man to see how you pick it, and how you pack it for him, and he will go back and get a little more money out of that

fruit for himself and for you too. If you are doing business on a large enough scale, get a good newspaper reporter out to your orchard, if you have to pay his railroad fare or carriage hire, or anything else. Get him to believe in you, get him to believe in your trees, and it will pay; there is always a good story to be had out of a good crop of fruit. You may convert your commission man and retail fruit dealer from a good many of his unsatisfactory ways of fruit handling and selling, if you show him you are trying to do better. We must use the commission man in a good many ways, and more and more through him, reach the consumer. It must be done by honest packing, a high quality of fruit, making it just a little bit better in the middle, if possible, than it is on the top; then put on your own labels, telling just what it is, and who grew it, and get the consumers out to your orchard; give them a taste of your fruit, and sell them a lot more for double what it is worth, and it will pay you. I could tell you of some large orchardists to-day, who are selling direct to the consumer, sometimes two and even three hundred miles away, once they get their acquaintance, and get their faith. It is very profitable, indeed, once you get their faith, and get into this business of direct family trade through high quality and honest pack of your fruit.

The next thing the peach grower is up against is the Yellows. That is something we are likely always to have with us. The first indication of it to most observers is when they begin to see a little pennyroyal like sprouts on trunk or main branches, and a little hectic blush or red spots on the fruit, with red thread like lines running through the flesh. We are up against not knowing what the Yellows is two or three years before it first shows itself in this way, and by that time it has reached serious proportions. At the first sign of it, take that tree out of the orchard; if it is on a Sunday morning, don't begin to leave it over Sunday. Pull it out then and there; if it is on a Sunday morning, get out and burn it before you go to church, even if you don't get to church that day. No matter whether you discover it in July or in September, take it out, and take it out at once. I speak thus feelingly, because I grow peaches more than any other fruit, and I have struggled against this dread Yellows and in some small degree overcome it. I told you that the nigger is a born gambler. We have three or four hundred of them on my place down in Georgia, and we have to have watchmen night and day. So when we catch one in any offense not altogether in the nature of a crime, we hold a court of our own on the place. I am usually the judge, and the superintendent is the prosecuting attorney, or he is the judge, and I am the prosecutor. We do this to save these poor fellows from being taken to court and delivered to the rigors of the law; down there they are pretty hard on the nigger, on principle. Well, on one such an occasion, I was acting as judge in the case of a colored brother who had been caught gambling; the superintendent was the prosecutor, and he made out his case. After he got through, I began to question the darky, but could not get much satisfaction out of him, then one of the older niggers came to me and said "Cap'n, I'se a good deal older nigger than you is, and I don't think you are going the right way to get the truth; you'se questioning the nigger what's got the money; if you'se

wants the truth, ask the follow what loses." And my experience has always been that you get nothing out of the nigger what wins; to get at the bottom of a thing you must ask the nigger what loses: so it is with the Yellows: I'm the nigger what loses, and I know there is no salvation unless you discover it and root it out two or three years earlier than you generally do.

In eradicating the Brown Rot, the self-boiled lime and sulphur wash, two or three sprayings of it in summer will pretty nearly control it. Certain varieties seem to invite it more than others. Take the Carmen peach, for instance; it is hardy in bud, delicious, of high quality, and a prolific bearer, but we find it seems more liable to this rot than most of the other varieties. Where an orchard has become infected with this Brown Rot, you must be prepared to fight it by burning all rotten peaches. Leave no mummies on the tree. Spray with lime and sulphur when dormant and with self-boiled later.

You think you are up against it in your peach planting here because of the competition of southern peaches, and so you are, but do not be discouraged; this competition is no more to be feared than the Rocky Mountain apples in competition with your apples. The southern peaches are beautiful in appearance, but they do not have the high quality and delicious flavor that your eastern Pennsylvania peaches have—or your eastern apples. You have the advantage of that high quality here in Pennsylvania, and in addition to that, you have the advantage of close proximity to some of the leading markets. These western people have to ship three thousand miles in order to reach our markets. Land out there sells at a thousand dollars an acre because of this craze for fruit growing. Here in Pennsylvania just as good fruit growing land is held at a much more reasonable figure. If you grow the right kind of apples and peaches and put them on the market in the right way, you will need to fear nothing from this western and southern competition.

I had some notes here about shipping packages, precooling, etc., but my time is about up. I thank you for your attention. If you have any questions to ask, I shall be glad to answer them, but I doubt whether you want any more to-night.

The President.—Are there any questions? If so, Mr. Hale will be glad to answer them.

Prof. Surface.—How high do you head your apple trees?

Mr. Hale.—I have about 15,000 trees that are headed from 15 to 18 inches high.

A Member.—How far North are you?

Mr. Hale.—Latitude 40 to 41.

A Member.—How do you detect the Yellows three years before it is generally discovered?

Mr. Hale.—I should have to take you to the orchard, but the first indications I have found are generally in the thick setting of the leaves up in the tops. I have seen the leaves eight inches long and two inches wide, set not more than half an inch apart on a rapidly growing central branch.

A Member.—How deep would you have the cultivation?

Mr. Hale.—Three, four or five inches; rather five inches than anything else.

Prof. Surface.—What implement do you cultivate with?

Mr. Hale.—Every implement of soil torture that I have ever heard of—plows, spring tooth harrows, disc harrows—everything I have ever heard of. I have some rocky land where the stones are very thick and we use everything we have ever heard of—anything that will loosen up the soil.

A Member.—What next?

Mr. Hale.—Oh, well, we get a slow-going pair of horses, and go over it with a sharp plow, lengthwise, and crosswise, and contrariwise—any way we can get around those stones; if you were to come there you would probably want to know where the land was; you would not see anything but stones.

A Member.—What varieties of winter apples is it possible to raise in your section?

Mr. Hale.—Oh, well, there is the Baldwin, the Rhode Island Greening, the Rome Beauty, the Jonathan—they are all winter apples.

Prof. Watts.—Are you including the Rome Beauty in your list of high quality apples?

Mr. Hale.—It is very much better with us than here in Pennsylvania.

Mr. Eldon.—How do you get your Italians, and how do you like them?

Mr. Hale.—They are mostly from the North of Italy, and love the land and love to work in it. Once get one good man, and you will soon have a lot of others. I always have more than I can use. Most of our men spend the winter in New York as waiters at hotels. I believe if you went to New York to-day you would find some of our men waiting on you at the Waldorf-Castoria, or some other joint.

Mr. Eldon.—What do you have to pay for that class of labor?

Mr. Hale.—A dollar and forty cents a day, and a house to live in. Men with families have a house, while the rest live in a barracks. There is a good big garden on the place, and the men seem to take delight in working it; it looks like a veritable flower garden.

Prof. Surface.—Do you have a cover crop for the peach trees, and cultivate the same as for apples?

Mr. Hale.—Yes.

Mr. Engle.—Do you cultivate for young apples the same as for old?

Mr. Hale.—No.

Mr. Good.—You spoke about having weeds for a cover crop; do you allow them to go to seed?

Mr. Hale.—Yes; I love weeds. There are a great many people in my country so lazy that they would not cultivate their crops if it were not for the weeds. I would rather have weeds than no cover crop at all.

Prof. Surface.—What about peaches as a filler for apples?

Mr. Hale.—As a theory it is all right, and I have one orchard where for twelve years I have had peach as a filler, and they have paid for themselves and a fine house and barn on the land, so I have a fine apple orchard that will not cost me a cent. When the peaches are out of the way, I shall probably change the method of cultivation somewhat.

A Member.—How far are your trees apart?

Mr. Hale.—The apple 36 ft., and 18 ft. for the peach trees.

Prof. Surface.—How long do you carry the peach trees?

Mr. Hale.—Fifteen or sixteen years—just as long as they bear well.

Prof. Surface.—Do the apple trees suffer?

Mr. Hale.—Yes; but the peaches furnish the money to pay for that suffering.

A Member.—Don't you break your plows in going over those stones?

Mr. Hale.—Oh, yes; but we have some factories in Connecticut which make sharp knives and plows, and we must patronize them and keep them busy.

Prof. Surface.—How long do you keep your peach trees profitable?

Mr. Hale.—Just as long as they live. I have never known a tree that was so old as not to be profitable. Some of the best bearers I have ever had are trees eighteen and twenty years old. I don't believe that any tree, peach or apple, should be cut down as long as it lives and bears well.

Prof. Surface.—I asked that question because at a public meeting some time ago I made the remark that I expected to keep my peach trees alive and profitable until they were twenty-five years old, and I was accused of being visionary and laughed at. I simply wanted to see whether I was not right.

A Member.—When and how do you apply fertilizer?

Mr. Hale.—Usually with broadcast machine and plow it in.

A Member.—On this particularly low-headed tree, how do you get the borer?

Mr. Hale.—I do it by proxy, the Italians get them.

Prof. Surface.—How do you keep those low trees from lying on the ground?

Mr. Hale.—A tree that wants to lie on the ground, we keep shearing and working at it constantly.

Prof. Surface.—What kind of a cover crop do you prefer?

Mr. Hale.—Crimson clover and Cowhorn Turnips.

A Member.—What time do you plant it?

Mr. Hale.—The 5th of August, as nearly as we can.

Prof. Surface.—In Georgia or Connecticut?

Mr. Hale.—Connecticut.

A Member.—What do you do with the turnips?

Mr. Hale.—Oh, just leave them in the ground. Sometimes we use Russian Vetch with them.

Prof. Watts.—What is the idea of using Cowhorn Turnips with the Crimson Clover?

Mr. Hale.—Along the early part of August we often have a damp spell, followed by a very dry spell, and the little clover plants

begin to suffer. Then the turnip makes a shade for the little clover, and in the winter they make a sort of mat for it.

A Member.—How long do you leave it go in the spring before you turn it down?

Mr. Hale.—That depends on the locality, and on the amount of work on hand. About four or five inches I like it best. Some people allow it to come to full bloom, and then plow it, but I do not like too many heads.

A Member.—How do you get in to the low trees to plow?

Mr. Hale.—Well we plow to one side of the tree, and use a chain a little longer than the whiffletree, and then we try the other side, and plow it just any way we can.

A Member.—Do you plow close to the tree?

Mr. Hale.—Oh, yes, but I don't know that it is absolutely necessary; I have known very successful orchardists who merely plowed in the middle of the rows, and then fed the trees well.

Prof. Surface.—How do you plow the soil—in the direction of the tree?

Mr. Hale.—Sometimes towards the tree, sometimes away from it—anyway we can.

A Member.—Don't you think the cover crop causes some rot?

Mr. Hale.—We know that a succession of cow peas causes too much nitrogen, and that causes rot, but in a peach orchard we can grow something else.

A Member.—Don't you have to plow cow peas a number of times?

Mr. Hale.—Oh, yes; and they bob up serenely every time.

A Member.—Do you sow them after corn?

Mr. Hale.—No; it would be too late to grow them, but if you grow clover, and let it grow until May or June, and then turn it over and plant cow peas, and when next fall comes turn them in, that will be all right.

A Member.—Would that be sufficient to give enough nitrogen?

Mr. Hale.—I don't know; you will have to ask the tree about that. You can't tell down here what is going to happen in Glastonbury.

Mr. Good.—What is the idea of the cover crop? It does not prevent the evaporation of the fertilizer.

Mr. Hale.—It is to protect the roots.

Mr. Good.—And cover the land?

Mr. Hale.—I don't want any free land.

A Member.—How do you prevent the land washing on the hillside?

Mr. Hale.—Well, we have a little trouble in that respect. On one sharp hillside, we set in alternate rows, so as to catch any soil that may wash.

A Member.—Is that a peach or an apple orchard?

Mr. Hale.—An apple orchard.

Prof. Watts.—What kind of a spraying machine do you use on the hillside?

Mr. Hale.—A good barrel pump and you will be surprised to learn that in some of my orchards we spray altogether with the knapsack sprayer. This is due to the fact that I employ a great many Italians, and they like best to work as they have been accustomed to do in Italy and I have found that when you let a man work in the way he is used to, he will do a whole lot better work, and do it more cheerfully, than he would otherwise. One of my best men, the foreman of the place, has a little vineyard out on the hill back of his garden, to make his native wine to take the place of the poisonous tea and coffee we use here. He used the knapsack sprayer there, and he figured out that it would be more economical to use it in the orchards, and so I sent over last year and got half a dozen more. Now we spray this hundred and fifty acre orchard of three or four year old trees entirely by knapsack. These Italians are happy in their work, and so do good work: give me a man or woman that is happy in their work.

Prof. Surface.—What do you do for borers?

Mr. Hale.—Dig them out and sit on them.

A Member.—What do you do about the twig borer?

Mr. Hale.—I have no trouble with them at all.

Prof. Surface.—That is because your trees are healthy.

Mr. Hale.—Yes; my trees are all healthy.

A Member.—Do you spray your peach trees in the summer with lime and sulphur?

Mr. Hale.—No; I have never done it myself, but they have been doing it in Georgia and one or two other states the past two years.

Prof. Watts.—The same strength as is usually applied to apple trees?

Mr. Hale.—No; I believe not.

Prof. Surface.—It is a good thing for winter, while the bordeaux is an excellent thing for summer.

Mr. Hale.—Yes, but not so good as the lime and sulphur.

The President.—Gentlemen, you will have time to work the pump on Mr. Hale to-morrow, and in order that some of us may have time to catch our cars for home, it will be necessary to adjourn pretty soon.

I would like to have the Committee on Nominations report as early in the morning as it is convenient to Dr. Mayer.

Dr. Mayer.—I would like to have that committee meet right here in this room immediately after adjournment.

Adjourned until Wednesday morning.

WEDNESDAY MORNING, JANUARY 20, 1909.

Nine o'clock A. M.

President Hiester in the Chair.

The President.—I have here a communication from the Cambria County Horticultural Society, stating that Mr. Abram Hostetler was elected a delegate from that society to the State Horticultural Association; I have also a letter from Mr. Settlemeyer stating that the Cambria County Horticultural Society was organized last Saturday with 108 members, 14 of them ladies. Another county heard from; we shall be glad to hear from every county in the State in the same way.

Mr. C. J. Tyson.—I would like to add that at their meeting on Saturday Mr. Hostetler was elected president.

The President.—So much the better; I suppose he is a member of our Association; if he is not, he should become one at this meeting.

Mr. Hostetler.—I just want to say at this time that I became a member of this Association last year.

The President.—The next thing will be unfinished and new business. The Committee on Fruit is not ready to report at this time; we will hear from them this afternoon. We have quite a lot of business, and but little time to get through with it. Is the Committee on Nominations ready to report?

Dr. Mayer.—The Committee on Nominations begs to make the following report:

For President—Gabriel Hiester.

For Vice-Presidents—Hon. W. T. Creasy, F. H. Fassett, R. M. Eldon.

For Recording Secretary—Chester J. Tyson.

For Corresponding Secretary—William P. Brinton.

For Treasurer—Edwin W. Thomas.

The President.—What shall be done with this report?

Mr. McSparran.—Our committee has made excellent nominations; I move that their report be received, the committee discharged, and the Secretary be instructed to cast the ballot for the officers as nominated.

The motion being seconded, was carried by unanimous vote and the Secretary was instructed to cast the ballot of the Association for the gentlemen as named.

The Secretary.—In accordance with the instructions of the Association, I take pleasure in casting the ballot for the following officers for the coming year: President, Gabriel Hiester; Vice-Presidents, Hon. W. T. Creasy, F. H. Fassett, R. M. Eldon; Recording Secretary, Chester J. Tyson; Corresponding Secretary, William P. Brinton, and Treasurer, Edwin W. Thomas.

Mr. Fox.—In the adoption of this report of the Committee on Nominations, I have noticed that the old officers of 1908 were re-elected, with the exception of one. I know you had a good set of officers during 1908. I know of Mr. Hiester's devotion to the cause of Horticulture, and I think you can all be proud of having a man like Mr. Hiester at the head of the Horticultural Association of Pennsylvania for the coming year. I know all the other officers. Mr. Brinton goes back to the early days of this Association, and Mr. Thomas is one of its old stand-bys.

I regret to notice that one name has been dropped, and I know that name has been dropped at the request of Mr. Engle himself, because he no longer feels able to do this work in connection with the other work he is doing. He has been a faithful worker for many years, and I think he deserves a vote of thanks from this Association. He has been Secretary for many years, with the exception of two years, while he was absent, and your humble servant filled the place. He gave his time and service cheerfully, and I wish to move that a rising vote of thanks be given to Mr. Engle, the retiring Secretary.

This vote was seconded and unanimously carried, and a rising vote of thanks for his faithful services was tendered Mr. Engle.

The President.—I want to assure you, gentlemen, that I appreciate the honor you have done me in re-electing me President, and the confidence you have shown in me. I don't know whether it was wise. I have always tried to merit your confidence, but I don't know whether it was wise to keep a man at the head of the Association until he begins to feel that he owns it—but when I begin to show signs of that, just warn me at once.

I join with my friend, Mr. Fox, in regretting that Mr. Engle has declined re-election. The name of Engle has been associated with this organization for so many years, that it does not look like the old association without the name of Engle to represent it, somewhere. But since he has declined, I am glad to see in his place a young man, who is so well able to do the work, and I am sure that we will go on, and in no wise lose by the change. I am sure that Mr. Tyson will have the support of this association in the future, as Mr. Engle has had it in the past.

Mr. McSparran.—At the meeting last year, at Lancaster, we had a fine exhibit of fruit, and I requested the Association to turn the fruits that were not taken back to the Women's Christian Temperance Union. I want to express to the Association the thanks of these ladies for the fruit turned over to them. I have been told that the habit of eating apples is a counter-irritant to the habit of drinking whiskey, and I am sure we could devote our fruit to no better cause.

The President.—Do you mean that the ladies are to eat the apples? Or are you a member of the Association?

Mr. McSparran.—No; I am not a lady. My wife is a member, and I pay her dues, and in that way, perhaps, become an honorary member. But I am authorized to thank the Association in behalf of these ladies.

Mr. Youngs.—If in order at this time, I would like to say a few words. It occurs to me that it would be a good idea for the society to have a "Field Day," that is, a summer session, when we could get together and review the actual work of the Association. I have attended quite a number of these meetings in New York State, and it strikes me that their pattern is quite worthy of emulation. I would merely throw this out as a suggestion, if the Society cares to adopt it.

The President.—Do you make that as a motion?

Mr. Youngs.—I would prefer the motion to come from some one a litle nearer the work of the society than I am, but in order to get the thing started I will make a motion to that effect.

The President.—It seems to me that the principal objection to a summer meeting would be the fact that it would come at a time

when the men actually engaged in growing fruit could not well be away from home for two or three days. If a time could be set for September, or a little later in the season, it would be all right.

Mr. McSparran.—I move that this matter be referred to the Executive Committee.

Mr. Youngs.—I second that motion.

This motion was carried, and the matter referred to the Executive Committee.

Mr. Youngs.—I did not intend this meeting to take the place of the regular meeting. It would be merely a supplementary meeting.

The President.—Our regular annual meeting is fixed by the Constitution.

Is there any further business? If not, the next thing will be to fix the place for our next annual meeting.

Mr. Fassett.—In selecting a place for the next meeting, I extend a cordial invitation to the society to wend their way up to Wyoming County, amongst those hills where we grow the Northern Spy. It has been the practice of the society to revolve just around a little circle here, and to meet with the fruit growers of York, Adams and Lancaster County, or here in Harrisburg. They no doubt offer splendid inducements to the society, but we think we are entitled to a little encouragement from the society. We have the climate and soil to grow good fruit, and we want you to come and meet with us and see what we are doing. Consider this well before you decide to hold the next meeting right down in this mellow pocket. We want you up there at Tunkhannock, Wyoming County.

Mr. Youngs.—While you are getting out of your regular beats, why not go a little farther and come to Erie County? We are not so much growers of the apple, although it is an apple growing country, but every other fruit known to horticulture in this State is grown up there. We have pretty nearly boxed the horticultural compass—grapes, and cherries and plums—and they grow to perfection up there. It occurs to me that you might come up there for your summer meeting. If you would get up say in September, it would not interfere with your business as fruit growers. Our latch string will be out. The 25th of September is the time we usually begin to harvest the Concord grapes, but any time prior to that would be acceptable. The early varieties of grapes will be well ripened, and we could take you through our vineyards, and over pretty nearly the whole Chautauqua field by trolley. In fact, you can go all the way from Buffalo to Chicago by trolley. We would be very glad to have you come over there to see us. Now, we always get more or less one-sided in our views if we do not get away, and I think we are entitled to some of your consideration.

Mr. Snavely.—It has been quite a long series of years since this society has visited our little city of Lebanon. We have a little

city of about twenty thousand inhabitants, and it is fifteen or twenty years since the Association last met with us, and I think the time has come when Lebanon wants another visit from the State Horticultural Association. We can give you a hall about twice as large as this, and if you bring three times as many exhibits we can take care of them. We have good hotels, and our people will be glad to welcome you. I bring this invitation by advice of the Lebanon County Horticultural and Agricultural Society.

Mr. Chase.—I would be delighted to have this Association meet a year hence in old Stroudsburg, that is historic ground, and a rapidly increasing fruit growing district, but I appreciate the fact that it is away off to one side of the State, and inconvenient of access, and expensive to get there. In view of that, I rise to second the motion for Lebanon.

A Member.—I want to emphasize Lebanon as a railroad centre. Then we have a hall four times as large as this, and the last few years our people are just beginning to waken up. There are only a few who really know how to grow fruit, and I think the object of the society should be to help those who really want to be helped, and so, when it comes down to voting, I would ask you to consider helping those who really want to grow fruit, and don't know how.

Mr. McSparran.—The greatest good to the greatest number, should be our aim. As the gentleman from Wyoming has said, the Horticultural Association has revolved around a comparatively small centre ever since its existence: Harrisburg, West Chester, Lebanon, Gettysburg, and Lancaster. The result has been that the membership has been drawn from around this centre. If we go to Wyoming or Erie, we will be going into new districts. Pennsylvania is unfortunate in only one thing—its geography and topography. It is divided by the mountains, and it is almost impossible to get the Western man East, and the Eastern man West. I belong to the Stock Breeders, and when we meet at Harrisburg, we have very few Western men, and when we meet at Pittsburg, we have only a few Eastern men. We should be very glad indeed, to have you come to Lancaster again next year, but I realize that this would not be fair, and I think we should take advantage of these invitations to go into a new centre, and, if possible, increase our membership, and arouse more interest in the Association.

Mr. Knuppenberg.—We have just begun our work in Wyoming County, and also in Bradford. The people up there are just beginning to be instructed in the matter of growing fruit, and fighting the San Jose Scale, and they are asking for more land to grow fruit, and it would seem to me that you gentlemen could do nothing better than to give us a little lift up there. We would extend our most hearty and cordial welcome to you, and invite you to meet with us at Tunkhannock in Wyoming County next year. I, therefore, want to make a motion that the Association hold its next meeting in Tunkhannock.

Mr. Fox.—I do not want to knock Tunkhannock, but I am afraid they have no daily newspapers there, and it is very important that there should be a daily newspaper where we meet. The last time we met at Reading, we had 108 members. I don't know how many you have here. I am not authorized to invite you to come to Reading; I have been away a little while, and I don't know what my standing is in my home society, but I know you would be very welcome. Now, Lebanon has three daily newspapers, and one of the Senatorial districts is made up of Lebanon and part of Lancaster, and I know from what my friend, Mr. H. C. Snavely, has said, that you will be very welcome to come to Lebanon, where they have daily papers, people interested in horticulture, and a room four times as large as this one. You have crowded quarters here, and it is well to take into consideration a desirable room in which to hold the sessions of the Association. I think you would, therefore, be wise in selecting Lebanon as the next meeting place.

Mr. Hostetler.—I represent the newly-born Horticultural Society of Cambria County, and I was instructed to ask you to come over there to us for your next meeting. I need not tell you that we are interested in horticulture, when we had our first meeting on Saturday, and started our Society with 108 members, 14 of whom are ladies. Johnstown is situated in the southwestern part of Pennsylvania, and has a distributing population of about 200,000. Carload after carload from New York and other centres is unloaded there, and from there distributed to this upwards of 200,000 people, which includes all of Cambria and Somerset, and a good portion of Westmoreland and Indiana. Therefore, I would heartily invite you to come to the city of Johnstown. We have three daily papers there, and will promise you all the newspaper advertising you want; and even more—a picture of the president and some of the representative men in the papers.

Prof. Watts.—I only want to say that this invitation has come as a surprise to me, and yet it is not a surprise because I know the interest of those people in horticulture, and their warm welcome to friends. Now, it seems to me that the State Horticultural Association should go to any place with a definite object, and one of its objects should be to increase its membership. I am not in favor of meeting in Harrisburg every other year. I think we should meet at Johnstown next year, and the following year in the new Horticultural Building at State College. I'll tell you why we should go to Johnstown; they are just beginning to take an interest in the work of the Horticultural Association; they grow fine fruit over there, and the people are anxious for encouragement. A young man from there came to me recently, and asked me if I did not think it would be a good thing to organize a Western Pennsylvania Horticultural Association. I told him "no." That instead of organizing such a society, they should become members of the State Horticultural Association, which covers the entire State. That is the reason why I think we should go over to Cambria or up to Wyoming, and to every other part of the State, so as to increase our membership, and our interest in every section, instead of only one little centre.

At Johnstown we have lots of good halls, good hotels, three papers, and best kind of people to welcome us. By all means come to Johnstown; you will do more good there than at any other place, I think.

The President.—It seems to me that the only way to settle this question is to accept all of these invitations, and have a monthly instead of an annual meeting.

I am glad to see this interest, and to receive all these invitations. We have never had so many before, and it pleases me to see the interest. I don't know whether it would be well to settle this now among yourselves, or to turn it over to the Executive Committee to settle, and avoid any dispute that might arise.

Mr. Hale.—Yesterday, when I heard the report of your worthy Treasurer, which showed 113 paid members last year of the great State of Pennsylvania Horticultural Society, I was surprised. It should have been 2,000. It might have been, had you scattered your meetings. In the little State of Connecticut, hardly larger than some of your counties, we organized our State Pomological Society fifteen or twenty years ago; at the first meeting we had between 175 and 200 members, and we decided to visit the fruit growers in every section of the State and hold two or more summer meetings. It got to be three or four live summer meetings right out among the trees and plants, where considerable time was devoted to discussion, and some to little group talks around the tree. We started these meetings, and at every meeting we got an increased membership—more than enough to pay the cost of meeting. So far as the society is concerned, the result is that in our little state we have a membership of 700. I don't make this as a criticism, but you become a local society when you stay right in one locality. Go anywhere you will, and have different meetings. I am inclined to think that in Pennsylvania, with her railroad facilities, it might be well to hold your annual meeting at some central point, and take your summer meetings all over the state.

Emphasis was laid on the newspapers; how many newspapers are represented here to-day?

A Member.—The Secretary gives them a report.

Mr. Hale.—He has other business to attend to besides running after the papers.

The President.—They have the legislators to watch just now.

Mr. Hale.—They probably need it too.

A Member.—I would like to second the motion to meet at Tunkhannock.

Mr. Youngs.—I was over in New York at several of their meetings, and they shamed me when I compared their attendance with ours. Now, as has been said here, it seems to me that we are

going in a rather prescribed area. So far as the 113 members are concerned, if I cannot double that on the Lake Shore, I will make up the difference out of my pocket. We have a larger membership in our local society. Your worthy president knows that we raise fruit over there. I have sixty acres in grapes, and am only small fry when it comes to grapes; I have more orchards in other fruit than in grapes. I have more plums. Two years ago I came over here to talk on brown rot, and curculio, and I am surprised that people have not controlled that yet. We started on that fifteen years ago.

Now, I know it is a long ways over there, but you will find our latch string out over there in Erie County. We have good accommodations there, and it is easy of access. If you cannot come to my own town of North East, I am willing to go to Erie, fifteen miles away. I know it will do you good. We raise gooseberries and currants, besides the grapes and other fruits, and all during the season, Heinz of Pittsburg, has his man on the ground, watching for the best fruit, and selecting it with care. Come to Erie County, and let us show you what we are doing there.

Mr. Creasy.—I have listened to this discussion, and have gotten some new ideas. This idea of a summer meeting out under the trees is a good thing. If we have a summer meeting, I would like to have it at Lebanon, right out under Brother Snavely's trees.

I think it would be a wise thing to turn the whole matter over to the Executive Committee, and let them find out what each place has to offer in the way of railroad facilities, hotels, and other accommodations. Now, I think the railroads might give you some inducement if they find out what you are trying to do.

Mr. Hull.—I think this would be a good plan, and I move that the matter be referred to the Executive Committee.

Mr. Fenstermaker.—I would like to rise and second the motion to go to Lebanon. Mr. Snavely is a host in himself. The place is easy of access, and our membership is right here in this locality.

The President.—Is the motion to refer the matter to the Executive Committee seconded?

This motion being duly seconded, a vote was taken which resulted in a division. A rising vote was then called for, which resulted in the carrying of the motion, and the matter of the place for the next meeting was referred to the Executive Committee.

Mr. Fox.—Who is the Executive Committee?

The President.—The elective officers constitute the Executive Committee. We will now take up Mr. Youngs' talk on Grape Culture.

Mr. Youngs.—Mr. President and Members of the Pennsylvania Horticultural Association. It certainly affords me great pleasure to come here and see you, and to watch the warm interest in

horticulture that is shown in the State of Pennsylvania. It was my privilege to come over here about six years ago, and again two years ago, and now to-day, and each time I find a warmer interest than before and I am glad to see it.

Now, I know I come from a section where my own interests are at present somewhat different from those of most of you gentlemen in the horticultural line. I come from a town which grows the most grapes in the world and that town is in Pennsylvania. I should be glad to have the summer meeting come up there.

THE GRAPE IN PENNSYLVANIA AND MODERN METHODS OF CULTURE.

By L. G. Youngs.

Pennsylvania makes no pretensions as a grape growing state, and a few of its people are aware it stands fourth in importance as a producer of the grape. That her acreage can be increased greatly goes without saying, provided care is taken to control black rot, and the funges diseases grapes are heir to. Our neighboring State of New York has several well defined sections where grapes are grown in a commercial way. The most important of her districts are the Chautauqua and Keuka Lake districts. The Erie district of Pennsylvania is really a part of the Chautauqua district, and my home town of North East is the parent town of the Chautauqua belt, and ships more cars of grapes than any other town in the belt, and more cars than any other in the world.

I have a little leaflet with me. It was issued by our local Business Men's Exchange. It has some information about yields of grapes and other fruits and may interest you.

I will take up now the question of vineyards, suitable soils, air-drainage, etc. These questions I shall discuss from the standpoint of the commercial grower. If I can answer any questions later for the amateur or home grower, I shall be glad to do so.

In planting the grape we prefer a loam or sandy soil, well under drained if any of it is inclined to be wet. Remember the grape, like most fruits, while a modified Baptist, does not believe in total immersion. Vineyards on extreme low lands are more subject to fungous diseases than on uplands, because of poor air drainage, and most of the lands are either clay or peat, which is not an ideal soil for the grape.

In planting the vineyards, land that has been used for some cultivated crop the previous year is to be preferred, and is plowed all the way from 6 to 12 inches in depth according to the whims of the planter, some being advocates of shallow, some of deep plowing; however, fit your ground thoroughly and mark in checks. Now you will find Concord grapes set 8x8 ft., 8x9 ft., 9x9 ft. Of these checks 8x9 ft. is the one now most generally used for the Concord grape. This gives 605 plants to the acre. Delawares and light wooded varieties are usually set closer, using 800 to 1,000 vines to

the acre, but many have the rows the same distance apart, i. e., 9 ft. The distance of 9 ft. is not an arbitrary one, but most of our grape wagons, gang plows and cultivators can be used to better advantage in that width of row.

The checks are now furrowed one way with a double furrow, using a large plow and a man on the beam on the return trip of the team. We are now ready for planting, and for this a root known as a 1 year 1 root is used, and is prepared in this way. You see we have a root left with 7 to 8 inches of root on each side and should remove the loose dirt from our furrow according before we commence planting. A few planters use the whole root, but I do not think as good results are obtained. The tendency when the whole root is used being to bunch the whole root system along under the wire, something to be avoided. A cultivated crop is often grown between the rows the first year, but it is a questionable practice, and I think it is better to cut out the nurse crop and give good cultivation.

The spring after setting, the vine is trimmed back to two buds, and is given thorough cultivation the same as it should have the first summer until last of August.

We now come to the second spring after planting, when if the vines have made a satisfactory growth, they should be again cut back as they were the previous season, and not allowed to fruit, but granting the growth to be good, we are ready for the "staking and wiring" of the vineyard. For this, chestnut posts and stakes are preferred, but any of the lasting woods can be used. Lengths of 8 to 9 feet for posts and stakes are the rule. At the end of each wire a post is used with a brace 10 feet long, and stakes are set to every three or four vines of Concord grapes throughout the row. On these two wires of No. 9 soft wire are strung, the first 30 to 36 inches from the ground, the second usually 24 inches above the first. A few vineyardists have used a third wire, but the practice is now an obsolete one, and I will not further consider it. In stapling, the wires are stapled to the stakes, seldom to the posts, which would be a bother when wires have to be restretched. One or two canes can be brought up from the ground, tied to the bottom wire with twine, and to the top wire of the trellis with No. 20 soft wire.

Some tie to the bottom wire only the first year, but the practice does not commend itself to me, because it is apt to give a lot of dirty grapes. The second year of fruiting more canes are brought up from the neighborhood of the first wire. In thrifty vineyards four and even five canes are sometimes used the second year, but I think three or at most four would be better. The natural tendency of fruit raisers is to overcrop—particularly is this the case with grapes, and too much caution cannot be exercised in the matter. These canes are tied in a fan shape, if the fan system of tying is used. Now while this and the arm system is generally used in our vineyards, quite a few are believers in the Kniffen system, in which as usually practiced with us two canes are carried to the top wire, over and then tied down. Another modification is to carry two canes to the bottom wire and two to the top wire, and tie at right angles to the main vine.

The single post or stake system, while it has much to recommend itself to those who grow for home use, is almost unknown in the Lake Erie belt. Along the Rhine the vineyards are all laid out on this single post system.

In the arm system, the arms are carried along the first wire at right angles to the main vine, and laterals are tied that come from these arms to the top wire for the bearing wood for the next season. This system does away to a great extent with the tying with twine to the lower wire, for after a few years, the arms become quite a permanent fixture, and are only removed when injured, or it becomes necessary to renew them. Now while there are other systems of training the grape, and zealous exponents of them for the commercial grower, those mentioned pretty well cover the subject.

Summer pruning is no longer practiced in our vineyards, but we do some tying of laterals that get in the way of the cultivator. Cultivation should be thorough, at least five, and better, eight times. The first tool used after the brush is removed and the vineyard tied is the hore shoe. Of these there are several makes. The Morgan now made by the Syracuse Plow Co.; the Buckeye, made by P. P. Mast, Springfield,O., and there are some other candidates for public favor.

In laying by the vineyard the previous year, we prefer to leave it slightly ridged under the wires. The horse hoe is used to remove this ridge, and any fugitive weeds or grass that has strayed in. The horse hoe does not count as a cultivation. Its use is immediately followed by plowing the vineyard with the gang plow, using three or four plows, and plowing to the depth of about three inches. Some plow twice during the season, but most of the growers only once, doing the balance of the work with the lever harrow and a horse cultivator which has disc wheels to guide the tools in the vineyard.

Before the vines are laid by, we turn a ligh furrow upon them. This covers all exposed roots and leaves us the ridge I spoke of for the horse hoe to remove the next season. The furrow is turned with a light one horse plow, or with the horse hoe blade reversed. Lay by the vineyard July 15 to 25 with a crop of crimson clover, cow horn turnips or something to furnish humus or nitrogen or both.

If I had advocated fertilizing vineyards 15 years ago, some of my neighbors would have thought I was a fit subject for a lunacy commission, so grounded were they in the faith that vineyards did not exhaust fertility, and while vineyards are doubtless less exhaustive than many crops to the land, yet grapes come every year, they are always demanding some element of fertility, and we must husband our resources or eventually have poor vineyards. Starvation rather than neglect is the history of the poor vineyards of our belt, and it is contemporaneous to the Christianity of the Methodist brother who said he had been a member of the Methodist church for fifteen years and it had not cost him a cent. May the Lord have mercy upon this kind of a Christian and this kind of a fruit raiser. We really have no use for them here.

We have found it necessary of late years to supplement the other labor in our vineyards with spraying with bordeaux to control rot, and with arsenate of lead to control the grape berry moth and

the grape root worm (Fidia Viticidi). If rot has been in evidence the season before in the vineyard, take no chances. Spray, and if a livid brown spot about one-quarter inch in diameter appears on the young leaf very early in the spring, spray, for this is the danger signal to the grape grower and antedates the appearance of the rot on the fruit. If there is no rot, spraying is often delayed until after blossoming, and arsenate of lead is added to the bordeaux at the rate of six pounds to the 100 gallons to control the berry moth and the root worm.

The root worm, whose habits and life cycle was not very well understood a few years ago, is the fly in our ointment at the present time, but we are not on the ragged edge of anxiety as much as we were. We can successfully fight them, and the matter is up to us.

Our member of Congress, Mr. Bates, succeeded in securing a special appropriation of $7,000.00 for carrying on this work, and we have had three government specialists studying the habits and life cycle of the pest for a couple of seasons, and with their aid, we are getting pretty well acquainted. The bug is not what the Irishman called one of the "dommed foreigners," but is of American origin.

I will next take up the harvesting and marketing of grapes. The harvesting of Concord grapes in our section usually commences about the 25th of September. The picking is mostly done by women; the price varies from one cent to one and one-half cents for an eight-pound basket; for the 40-pound crate three and four cents are paid. One hundred and twenty-five to 175 baskets of eight pounds is a day's work, but some extra swift pickers pick as high as 200 baskets per day. The cost of the eight-pound baskets with cover is about 2 cents each. The cost of the 40 pound crate is 6 cents. Most of the packing is now done in the field. A light stand is used, holding three baskets. When a basket is full, the picker, who is known by a number, places her number on the handle of the basket; also the number of baskets she has picked during the day, and places the basket under the vines out of the way of the gathering wagon. The driver, whose duty it is to keep the pickers supplied with empty baskets, keeps the tally of the baskets he hauls to the field, and also sees that the pickers' count of picked grapes agrees with his when he hauls to the storage house. Both the pickers' and his own count are given each day to the owner or manager of the vineyard, and by him credited.

The grapes remain in the storage house from 24 to 48 hours, when they are covered and hauled to the station, are loaded into refrigerator cars, after being inspected and pronounced satisfactory, and if the weather is warm, are iced with about four tons of ice. A car is loaded with baskets, 10 to 12 high and contains 3,000 to 3,300 baskets. In inspecting a load of grapes, the inspector endeavors to examine some baskets of each picker's packing and if her work is slighted or improperly done, her number leads to detection, and she has to correct the fault in the future or she is discharged.

The bulk of the grapes is sold by the growers themselves, who are organized into an association, with a manager, secretary and board of directors, who retain one-half cent on a basket and $1.00 per ton on bulk grapes as an expense fund for loading and marketing. If this is more than sufficient for the purpose, the balance is

returned to the grower. The sales of grapes are pooled in periods of three days, each grower receiving the same price that have shipped in that time. All the large associations keep a representative or agent in the principal distributing centers, like Chicago, Pittsburg and New York. If from any cause, the market becomes bad, the agent notifies the home office and shipments cease for a time to that point. If the markets generally become disorganized, word is passed to the growers and picking and loading is suspended until the markets rally.

The manufacture of grapes into jellies, unfermented juice, etc., is becoming quite a factor. We are building such a factory at my home town of North East. The plant has a capital of half a million dollars, and is expected to be one of the largest in the United States. This will materially affect the shipment of grapes from our station, and give us a home market for much of the products of our vineyards.

The trimming of vineyards is mostly done in winter. The brush is removed from the wires and hauled out then or in early spring with a horse hitched by a chain six feet long to a pole 15 feet in length. This does the work very well and better than would seem possible. The brush is burnt, broken stakes replaced, wires tightened in the spring, and the tying is done by women, who are paid from 12½ to 15 cents per hour for their labor.

Women help board themselves in the boarding houses which the growers have built for that purpose and furnished with stoves, tables, chairs, bedsteads and mattresses. The pickers provide their own sheets, quilts and provisions. Butchers, bakers and grocery wagons visit those away from the towns and keep them supplied throughout the season.

We have found it necessary to insist upon certain rules among our help. A fixed rule for retiring is among the most important. There are always some among the girls who will keep late hours, if we allow it, and by disturbing the slumber of the tired ones put your whole force on the "drydock for repairs" the next day. The work is not play, but it is healthy and will perhaps often save a trip to the Hot Springs or Mount Clemens and leave more money in their pockets. We call this the grape cure and are particular to extol its virtues when we are short of help; so you see we are not entirely disinterested in recommending it.

Now in an article of this kind I cannot, for want of time, go into all of the details. Some things I have doubtless left obscure to you. I have only mentioned the two packages that are most used, but, as a matter of fact, nearly all varieties are put up in smaller packages; Delawares and Catawbas in two, three and four pound baskets. Many Niagaras in 20 pound baskets with raised cover. Well, you may determine from the tenor of this article that I am somewhat of an optimist. The fact of the matter is we do not have any pessimists in our section of the country. We think we have almost as much cause for self congratulation as the convivial individual who had been out with some boon companions and had to be carried home at an early hour in the morning. His friends conceived the idea of leaving him in a cemetery they were passing, to sober up and then concealed themselves to await developments.

He finally came back to semi-consciousness with the dawning light and staggering to his feet looked at the memorial tablets and said: "Well, if this isn't the resurrection morn, and I am the first man on the ground."

If a bit of this spirit has crept into this article and if I have said anything I will be sorry for, I am willing to be forgiven. At any rate I am going to extend the olive branch of peace. I am going to invite you to be our guests, the guests of the Horticultural Society to Erie County, which is located at North East, at your next annual meeting. Our invitation is in the hands of your secretary and we hope you will avail yourselves of the opportunity to come and visit us. We will make your stay pleasant and profitable. We will hang our latch strings out. We have abundant hotel room for such of you as we may not be able to induce to come to our homes, and my friend Watts of State College, will be your guide and see that you get back home reasonably sober.

Now we have met as "ships that pass in the night." You have been kind to a stranger from Jericho. I sometimes lose my temper, but never my memory, and in thanking you for your patience and indulgence, I hope I may be allowed to say that I have enjoyed meeting you again very much. I will carry away most pleasant recollections of this meeting. If any of you should become birds of passage through our country, come and see us. We will be blood brothers. This invitation has all seasons for its own. I thank you.

The President.—Are there any questions that you would like to ask Mr. Youngs? If so, he will be glad to answer them.

A Member.—I wish he would explain to us how to prune the currants. I have quite a patch.

Mr. Youngs.—Well, now, that is not so much my business, but we grow a great many currants. We prune back about one-half of the growth, perhaps two-thirds of it. We control the worm with arsenate of lead or Paris Green. Now, with that plant we have practically boxed the compass, and our leader to-day is the President Wilder; for a pure white, we use the White Imperial.

A Member.—I use the Red Cross, and find it very satisfactory.

Mr. Youngs.—The trouble we have with the Red Cross is that the market is not always ready to take our berries, and the President Wilder is in better condition to stay on the bushes awhile than any other, up in our section. They will hang on the bushes for weeks when the others will wither. We send a good many to Pittsburg on the afternoon trains, for sale the next morning. The returns are 'phoned to us about ten o'clock in the morning, so we know the condition of the market from day to day.

A Member.—Do you advise spraying before the crop is in bloom?

Mr. Youngs.—If you are troubled with the rot. I don't believe that in all the grapes we raised, we had any rot last year, and we had 1,070 full cars of grapes go out from North East, besides local shipments. Of course, with our vines in this healthy condition, it is not necessary to spray so much, but in order to control the anthracnose and mildew, which comes on the stems of the fruit we have to use bordeaux sometimes during the season. In order to control rose bugs, we add to our bordeaux six pounds of arsenate of lead to the hundred gallons.

A Member.—How often do you spray?

Mr. Youngs.—That depends on weather conditions. Last year we had an abnormally dry season, and we only sprayed the greater part of our best vines twice. Most of it was done in one spraying. The spraying remained on the vine, and that was all that was necessary to control the worm.

A Member.—Is it safe to spray when the berry is nearly grown?

Mr. Youngs.—I would not do so with arsenate of lead; that is poisonous. We treat with lead right after the blooming time, when the berry is small, and we have never had any injurious effects. It is estimated that in order to get any ill results from spraying, it would be necessary to eat about two tons of fruit at a time. That is the amount of arsenate of lead we would get from these small grapes.

A Member.—At what time does the rot usually affect your crops?

Mr. Youngs.—Well, when we were in the kindergarten class we did not understand rot very well, and we waited until it appeared in the full-grown berry. Now we know that when we see a speck about the size of a pinhead turn black, it is rot, and it is a danger signal. When you first see the small red-brown spots on the leaves, about quarter of an inch in diameter, then it is time to hitch up and spray your grapes.

A Member.—I never had the rot until two years ago, and then it attacked the full grown berry.

Mr. Youngs.—You did not know how to look for it. When you first see the little round reddish spots on the leaves is the time to spray. After a little while you will get so that you can easily detect it.

A Member.—Do you use commercial fertilizer?

Mr. Youngs.—Why, yes; we use quite a lot of it. We like to buy our nitrogen from nature, and so we get crimson clover; if we are not always able to produce enough, owing to natural con-

ditions, we have been using nitrate of soda, about 400 pounds to the acre, putting it on in three applications. You get quicker results this way than any other way. If you need potash, you can get it from the potash sellers.

A Member.—In pruning, how many buds do you leave?

Mr. Youngs.—Well, in a young vine, I would not exceed 25 or 30—probably not over 25 the first year, and in an older vine about 40 or 50 buds is all you want. The tendency is to over-crop.

The President.—This discussion is very interesting, but in order to cover our ground, we will be obliged to pass on to the next subject. Prof. Watts will now speak to us on "Modern Truck Farming."

MODERN TRUCK FARMING.

By R. L. Watts.

Mr. Chairman, Ladies and Gentlemen:

I consider it a special privilege to address this Association on Vegetable Gardening because I believe the subject has been neglected in the discussions of horticultural societies in the East. The growing of fruits has received the most attention from organized eastern horticulturalists and it is exceedingly gratifying to note the growing interest in market gardening. I feel that the programs for the annual meetings of the great eastern horticultural societies are not complete without several topics devoted to the growing of vegetables in the open ground or under glass.

Some of the eastern states as Maryland, Delaware, New Jersey and Pennsylvania possess unusual advantages for the growing of garden crops. The great fertility of soil and favorable climatic conditions in these states make it possible to grow a full line of vegetables and the easily accessible markets pay the best prices for vegetables of high quality.

Agricultural Experiment Stations are giving more attention than formerly to investigations with vegetables. Unusual interest is being shown by several stations at this time, experiments are being conducted along important lines as companion cropping, the proper use of fertilizers, and the breeding of plants of superior merit. It is believed that our Experiment Stations will in the near future furnish data of great value to growers of all kinds of vegetables.

There are two general classes of vegetable growers. First, those who are growing a great variety of crops on either a large or small scale; and, second, those who are producing special crops on a large or small scale. Growing a variety of crops possesses certain advantages: first, the possibility of following a desirable rotation and, second, it furnishes a variety of vegetables for market at different seasons of the year with less probability of flooding the market with a supply greater than can be disposed of to ad-

vantage. With a variety of crops there is little danger of serious losses from fungous diseases and insects and it is also less difficult to maintain soil fertility than when a special line of cropping is followed. On the other hand, growers who produce special crops are likely to become masters in the business, securing the largest yields and the finest quality. As a rule, the specialist has less difficulty in selling his produce at good prices because he is better known than the general grower. The question whether a man should produce a variety of crops or confine himself to a few vegetables depends largely upon local conditions and facilities for marketing.

The growing of a great variety of crops on a large scale is usually confined to farms within easy reach of large cities. The business is generally satisfactory because the producer deals directly with retailer, jobber or commission merchant and he does not take as great risks as growers who must ship by rail.

One of the best examples of a market gardener and fruit grower producing a variety of crops on a very large scale is Mr. Horace Roberts, of Moorestown, N. J. Mr. Roberts has about 1,000 acres of land, nearly all of which is devoted to the growing of fruits and vegetables. The most unique thing about Mr. Roberts' farming is that his usual practice is to buy run-down farms, plant them in orchards, and by growing vegetables between the fruit trees, pay for the farms from the sale of vegetables during the first two or three years. This businesslike method of farming has for its primary purpose the growing of orchards which are very profitable after reaching a bearing age, and yet, the vegetables grown between the trees are very remunerative regardless of the fruit trees which receive the best kind of care with this system of tillage. Companion cropping is practiced to the fullest extent on these New Jersey farms. A typical plan is to set apple trees with peach trees for fillers. Dwarf peas are generally sown for the first early crop with rows about five feet apart. Later in the spring, after danger of frost, a row of tomato or other vegetable plants is set between the peas. After the last picking of peas, the vines are cultivated into the soil and the land between trees devoted entirely to tomatoes and other crops until late in the summer when a cover crop is started. Crimson clover is the most valuable crop used on Mr. Roberts' farms as well as on most other truck farms in New Jersey. It is ideal, because being a legume, it gathers free nitrogen from the atmosphere and when plowed under furnishes rich organic material to feed crops that may be planted in the future. If tomatoes and other vegetables are harvested too late to give a good start of crimson clover, rye is sown. No land is allowed to lie bare on these farms if it can be avoided.

Another plan commonly practiced on the Roberts' farms is to plant peas followed with beans drilled between the rows of peas and the beans followed with crimson clover. Peas are used most extensively for early spring planting. Two hundred and fifty acres were planted last year, using as inter-tillage crops, tomatoes, cabbage, cucumbers, watermelons, muskmelons, sweet corn and a few other vegetables. The method is satisfactory in every particular and it should be practiced more largely. Another unique plan used is to set strawberries early in the spring in rows five feet apart, the

plants placed two and one-half feet apart in the rows. About the first of June, tomato plants are set in every other space in the middle of the strawberry rows. The plan has been found very satisfactory, giving a heavy crop of tomatoes and the vines of this vegetable do not seem to interfere seriously with the growth of the strawberries, so that a full yield is obtained the following spring. With this plan, peas are also drilled between the strawberries. Most of the produce from the Roberts' farms is hauled on wagons eleven miles to the Philadelphia market.

I wish to mention in this group of truckers, Mr. C. C. Hulsart, Matawan, N. J. Mr. Hulsart is one of the prominent Grange farmers of New Jersey and the most striking thing in his farming is that he is an enthusiast on growing practically all the seed used on his farm. He exercises the greatest care in selecting seed of asparagus, tomatoes, peppers, sweet corn and other vegetables which are being grown for the New York market. He believes that a gardener cannot afford to take chances buying from seedsmen who find it impossible to exercise a close supervision over much of the seed offered to the trade. Growing your own vegetable seeds is a commendable practice, provided it is done with care and intelligence. During the past year, I have met quite a large number of growers who have secured by careful selection some fine strains of vegetables. Many of the vegetables placed on the market as novelties have had their origin on farms of progressive market gardeners. Examples are Earliana tomatoes, Jenny Lind muskmelons and Roberts' watermelons. These two melons originated on the farm of Horace Roberts. Many truckers and market gardeners in Maryland find it desirable to save their own seeds. This work has been conducted to such an extent in some sections that special strains have been developed that are used almost entirely in such localities. It is not possible for the gardener producing a great variety of crops to grow all of his own seeds especially if he is giving attention to vegetables which require certain soil and climatic conditions for the production of the best seed. For example, it seems to be difficult to grow good celery seed in the eastern part of the United States. The most of the seed of the self-blanching varieties comes from France, while seed of late varieties such as Golden Queen and Giant Pascal are mostly grown in California.

One of the most successful and progressive market gardners in Pennsylvania is M. Garrahan, Luzerne County. He has two sons, R. H. and Ernest, who are just as enthusiastic in their work as their father. A careful study of their business shows that their success is due largely to two factors. First, the use of the best seed that can be procured, and second, the most liberal use of commercial fertilizers and stable manure. Mr. M. Garrahan has been a very careful breeder of vegetable seeds for many years and he has developed a type of Wakefield cabbage which some consider superior to better known strains of this variety. All kinds of seeds which may be grown successfully with existing conditions are produced on the Garrahan farms. There is no stinting on this farm in the use of manure and commercial fertilizer. Manure of the highest quality, containing practically no litter is secured from the stables in the hard coal mines and this fine manure is especially good for green-

house crops and vegetables grown in the open ground which require manure that is free from coarse litter. It is not an unusual thing for these gardeners to apply twenty-five to forty loads of manure per acre. Commercial fertilizer, home mixed, of the highest grade is used most freely. From one to two tons per acre is considered about the right amount on this farm for most crops. An important factor in maintaining soil fertility on the Garrahan farms is the use of crimson clover. An effort is made to have all ground covered with this legume during the winter season. A few years ago when visiting this farm, I found a field so densely covered with crimson clover that a bare spot as large as your hand could not be found in the entire field. The following spring this clover, covered with manure, was plowed down and fertilizer used at the rate of a ton per acre. With such liberal feeding, is it any wonder that yields of potatoes run from three hundred to four hundred bushels on this Luzerne County farm? Numerous examples might be given of other men in various parts of the East who have been highly successful in the growing of a variety of crops on a large scale. The rotation of crops with such farming is a factor which should not be overlooked.

The gardening operations of Hon. R. F. Swartz, Monroe County, are of more than usual interest. Mr. Swartz conceived the idea some years ago of growing vegetables on a large scale and selling at retail to consumers in the summer resort regions in the county. He grows a long list of vegetables which are in demand with summer boarders. With such a line of farming it is important to secure highest quality. This is accomplished by the selection of proper varieties and by growing the crops as rapidly as possible. There is no question about the fact that succulence counts for more than anything else and it cannot be secured unless the growth is rapid. Nitrogenous fertilizers are used extensively. Yields are large and the business as a whole is most satisfactory. Companion cropping is practiced to a considerable extent.

Thousands of farmers throughout the East are growing a variety of crops on a small scale. A large percentage of them live near enough to cities to market by wagon, hauling an assortment of vegetables with other produce as butter, eggs, potatoes and fruits. The vegetables most commonly grown on such farms are cabbage, tomatoes, sweet corn, peas, beans and other vegetables that may be grown successfully with existing conditions. The produce is often sold at retail and profits are necessarily large. It is a desirable form of market gardening for farmers who find it convenient to attend market regularly.

There is another class of vegetable growers generally spoken of as market gardeners who usually operate in close proximity to large cities. We often find such men cultivating vacant lots and an effort is made to perform all work in the most thorough manner. This kind of farming may be found on Long Island and near every large city. The land where such gardening is followed is usually high priced and labor also expensive, but close proximity to the market makes it possible to put his vegetables on the market in the best condition. In nearly all cases the manure can be secured at a minimum cost. With liberal manuring, the land is kept at a high

state of fertility and this makes it possible to intercrop and have one crop follow another in quick succession.

May I call attention to one little farm on Long Island which I visited several years ago. It contains eight acres and gives steady employment to thirteen men during the entire season. One team is kept busy the year round hauling manure from the city. This is applied several inches deep every year, making the soil a great storehouse of plant food and a reservoir of water ready for the crop at all times. The owner of this farm told me that his crops never suffered for want of water. No commercial fertilizer is used on this farm.

Market gardeners following this extensive system intercrop to a great extent. For example, the first sowing in the spring of the year may be lettuce with rows from ten to fourteen inches apart. After the lettuce is cultivated for the last time a row of beets is drilled between the rows of lettuce. The lettuce is soon harvested and then the ground is given over to the beets and after this crop has received its last cultivation, some other crop as carrots or turnips is drilled between the rows. By this system of cropping it is possible to remove from four to six crops during the season and, with proper management, such cropping is very profitable.

Another line of gardening which is popular in many sections is the growing of special crops on a large scale. Examples of this line of gardening is the production of early cabbage in the Norfolk and South Carolina districts and other sections of the South; lettuce and celery growing in Florida; Danish Ballhead cabbage in New York; tomatoes for shipment or canneries in Maryland, Delaware and many other states; onions in Ohio, Michigan, Massachusetts and other states where the crop is grown extensively; celery in the Kalamazoo district; peas in New York; cauliflower on Long Island; and asparagus in New Jersey. There is less worry, perhaps, with this kind of vegetable farming than any other line. The grower attempts to thoroughly master every detail connected with the crop and a few years of experience enables him to select the market which pays the best price. A common practice is for the product to be sold at the railroad siding when there is often the keenest competition of city buyers. Examples of this may be found in Caroline County, Md. A great many general farmers would find this method of cropping profitable. Some men are using land for potatoes when, perhaps, early or late cabbage or tomatoes would be more profitable and the cost of production, perhaps, little greater. With a special line of cropping, rotation should be followed, planting when possible on clover sods. Without rotation, the planting of these crops on a large scale is likely to prove disastrous because of increasing trouble with diseases and insects.

Many growers in all sections of the East find that special cropping on a small scale pays the largest profits. For example, dairymen whose soils have been built up to a high state of fertility often find that some gardening is very profitable. It may be a few acres of cabbage, cauliflower, onions or other crops which thrive and do their best because of the very rich soil in which they have been planted. I have seen a number of farms where a few acres of special crops have made unusually large profits. Some of these

men possess more than usual skill and by confining their efforts to one or two crops they become thoroughly informed concerning every detail.

A rural mail carrier in Pennsylvania makes large profits from a very small acreage of Danish Ballhead cabbage. He fertilizes liberally, cultivates thoroughly, uses the best seed and sets strong plants. His annual yields are large and the highest prices are secured.

Another example of a grower who secures the largest returns is M. L. Ruetenik, of Cleveland, Ohio. Mr. Ruetenik is a grower of lettuce under glass but cultivates several acres of celery from which gross receipts are usually about $1,200 per acre. His methods are radically different from those used by most growers. Golden Self-Blanching is sown in the greenhouse about the first of March. Sprayings with bordeaux mixture are made at intervals of ten days until the plants are set in the open ground. The plants are set at intervals of six inches in rows two feet apart. No manure is applied before transplanting. Thorough and frequent tillage is given until the plants are six or seven inches high when manure is used as a top dressing at the rate of forty tons per acre. No further tillage is given the plantation. All water is applied by sprinkling. The method has proved entirely successful.

Hull Brothers, Waymart, Pa., are celery specialists. They plant annually only three acres of land, but returns from this small acreage are larger than from many farms of one hundred acres or more. Two things are especially striking about the farming of Hull Brothers. First, the use of an unusually large amount of commercial fertilizer; second, close planting. Over eight tons of fertilizer were applied this last year on three acres. The fertilizer cost over $100 per acre. The soil is a black muck, naturally acid, and as commercial fertilizers are used extensively this firm finds it necessary to apply lime to prevent the soil from becoming very sour. Early celery is grown more extensively on this farm than late celery. The rows are three feet apart and plants four to five inches in the row. With such high feeding, Hull Brothers are of the opinion that close planting has little influence on the size of plants. The crop is blanched by means of boards. Blanching begins early in August and is continued until the crop is sold. Twelve inch boards are placed on each side of the rows and held in place by means of strong wire hooks. The boards when not in use are stored carefully to protect from the weather and to prevent warping. When boards are used, about ten days are required to blanch the celery ready for market.

There is no better example of specialized gardening than on the Patapsco Neck, near Baltimore, Md. I attended a Farmers' Institute in this section a few years ago, and had the pleasure of meeting many aggressive growers. They understood all the details connected with the special crops receiving their attention.

I have described various methods employed in market gardening but the fundamental principles are essentially the same in every case. Growers everywhere find it necessary to use modern methods of tillage. Large crops are seldom grown without the use of liberal quantities of fertilizers. The soil must not become depleted in

vegetable matter and, therefore, stable manure and green crops are used extensively in all sections. Good seed must be employed to secure the best results and more attention is being given every year to this important factor.

Methods of marketing are being studied more than ever before. Growers have discovered that the appearance of their produce has more to do in securing good prices than anything else. Every possible effort is being made to place the vegetables on the market in a neat, attractive condition. Greater care is exercised in the selection of packages. Many growers claim that small packages are the best for various reasons. Special means of attracting attention are being employed, such as the use of narrow blue or red tape for bunching asparagus, rhubarb and celery. We have learned that careful handling in the harvesting of vegetables counts for a great deal and that too much care cannot be exercised in grading and sorting. All of these items are important in securing good prices and I believe that the most important lesson to be learned by the average market gardener is the skillful marketing of his vegetables.

If there are any questions I can answer, I shall be glad to do so.

A Member.—What would you do for the maggot which causes so much injury to our cabbages?

Prof. Watts.—It has been suggested that we use small cardboard disks, and slip them over the plants very early. Carbolic acid emulsion has also been used with good effect.

Mr. Youngs.—In the early days of my fruit growing I had to do something for a living, so I raised cabbages. We had the maggot, and we used saltpeter water. It will kill the worm and hasten the growth of the plant. Up in Waterford they grow cabbage very largely, and near Ashtabula, I have seen thirty-five and forty acres of growing lettuce. Ashtabula, of course, is in Ohio, but near enough for us to annex it.

Mr. Hale.—I was deeply interested in the gingery talk of Prof. Watts. That is what the horticultural society of which I have talked, tries to impress upon its members—that the selling end is the profitable end of the crop. The trouble with our fruit growers has been that they never go near the cities, to watch the markets. They stay at home and look after the growing end of the work. What you want to do is to go to the market and meet the men who buy our fruits, and see what they want and what they really are buying, and when you do so you will notice that it is always the attractive looking product that brings the highest prices. A product of high quality loses a good deal of its selling power if it is presented in an unattractive manner, while a product of high quality, presented so as to catch the eye, will catch the purse of the buyer as well. I don't doubt that red ribbon that the professor was talking about was cotton tape, which the grower bought for about half a cent a mile. Right down in the asparagus district of Chicago, near South Water Street, the Michigan shippers send in their product, and I have seen the boxes come in old and dirty, kicked around there for awhile,

and finally find their way back to the owner—regular "old subscriber" boxes, I call them—tied with coarse twine, and showing all over the same sandy soil. Then near them I have seen another lot, in clean, white boxes, with the owner's name stencilled on them, and the asparagus nicely grouped and tied up with a pink ribbon. What was the difference? Why, the "old subscriber" brand sold at 6 cents, while the "best girl" brand sold at 10 cents. There was that asparagus jumping from 6 cents to 10 cents just because the grower had known enough to put it on the market in an attractive manner. I knew neither of these growers, and could only judge them from their boxes, but there was no doubt as to the business sense and judgment of them. It made some trouble to group and tie up this arparagus, but it paid 4 cents more to put the "best girl" brand on the market than it did for the "old subscriber" brand. The marketing end of our produce is the one that needs to be emphasized very strongly to growers.

Mr. Youngs.—Why not use a rubber band in putting up asparagus and rhubarb and celery,—anything of that kind. It looks better than twine, and is quicker.

Prof. Surface.—Some of you may wish to know the details of the carbolic acid emulsion; they are published in the bulletin of the Division of Zoology, I think for April, 1907. We give the results of our experiments, and they are in accordance with what Prof. Watts has said.

Mr. Hostetler.—May I say that I have used that emulsion with considerable success and it has the advantage of being cheap.

The President.—I am sorry that I am obliged to curtail this subject; it is very interesting, but it is necessary to pass on to the next subject—the report of Prof. Surface on Orchard Inspection and Demonstration Work in Pennsylvania.

REPORT ON ORCHARD INSPECTION AND DEMONSTRATION WORK IN PENNSYLVANIA.

Prof. H. A. Surface.

Mr. President, Ladies and Gentlemen:

The subject upon which I have been requested to speak is that of the Inspection and Demonstration Work done in Pennsylvania. We have, as you know, instituted an important work in Demonstration Orchards in regard to controlling pests, especially the San Jose Scale. We have seen the need of this, and the matter is an important one to us all. We must all work together to rid our orchards from this pest. We have seen the day when the so-called Professor Amateur and Professor Would-be could tell us what to do, without soiling their hands but that day has passed; we must

all get out and work and soil our hands to fight these pests, and help the other fellow. On the other hand, we have never seen the day when the people demanded scientific information in such a practical manner as they do to-day. They want to be shown how; not left to work it out by themselves according to some other person's theory. I think it would be a good thing to have a demonstration market garden in every county in the State, with Prof. Watts or some of his assistants there, demonstrating it to the people. That was the only way to teach how to control the San Jose Scale—to demonstrate it to the people, and as the result of these demonstrations, I have had the pleasure of seeing thousands and thousands of trees that would have been cut down for firewood saved and produce first class fruit for the owner which sold for thousands of dollars as well.

It is this, then, that the knowledge which the State has been giving out for some time from our State Experiment Station up at State College and by our own Deparment here, has brought about. Instance after instance, we have, of orchards that have been saved through this work; hence the necessity of demonstration. But before I say anything about demonstration, I wish to say a word about inspection.

The first thing necessary to know, is for a man to know when he has these pests on his premists. Once in a while I receive a letter from a man who says his trees are affected; what shall he do? He might just as well write to a veterinary surgeon and tell him that his stock is sick, what shall he do; without telling him what kind of stock it is, or describing the disease. The first thing you have to do is to learn to recognize the symptoms of the different pests, and then treat each thing in a definite manner. Then, again, some men read the results of experiments, and have trouble in mixing the different ingredients properly, and they do not get the results; or they may not know how to spray thoroughly. So it was decided to organize a course of inspection in this State to be made by a reliable corps of demonstrators under the supervision of the Division of Zoology of the Department of Agriculture. Since inaugurating this inspection we have inspected 4,500,000 apple trees, over 2,500,000 peach trees, and over one-third of a million pear trees, and nearly a million of plum and other trees, making a grand total of over 8,000,000 trees. And some counties we have not entered because we did not have the funds to extend the work. As to value, would you let a man cut down one of your fruit trees for five dollars? No man with even the slightest knowledge of the value of a tree would do that, but taking that low figure as a basis, I will state as my opinion that there are over $100,000,000 worth of fruit trees in the State of Pennsylvania, to-day, and there is considerable more planting being done. Nurserymen will tell you that five, six, or even ten years ago their sales fell off considerably, but to-day they will tell you, also, that for the past two or three years their sales have been larger than for the six or eight years previous. What does this mean? The people are taking courage. A way has been found to control the scale, and with the scale under control we will soon have as fine orchards as there are to be found anywhere, producing a first class quality of fruit.

In speaking of this work, I should like to show you these pictures. I will leave them here, so that those of you who wish to do so, can look at them at noon. They are pictures of the Demonstration train on the Cumberland Valley Railroad. The Cumberland Valley Railroad placed at our disposal for over three weeks, this train, consisting of a baggage car and passenger car, and from this train we talked to large numbers of farmers showing how the trees were to be treated. You will see how interested the people were, and how they even stood out in the rain for hours to hear us talk, and followed us from place to place in many instances. It simply shows that our fruit growers are in earnest, and that is a hopeful sign. I think, Mr. President, this will be a very good place for me to stop.

WEDNESDAY, JANUARY 20, 1909.

1.30 P. M.

The afternoon session came to order with the President, Mr. Hiester, in the Chair.

The President.—I will now call on Mr. Hale to tell us about "The Clearing, Planting and Culture of Rough Land Orchards."

THE CLEARING, PLANTING AND CULTURE OF ROUGH LAND ORCHARDS.

By J. H. Hale.

I saw an advertisement in the paper the other day, which read something like this: "Wanted; a man to drive a pair of mules, of a good Christian disposition," and in tackling this rough land problem, you want both men and mules of a good Christian disposition, in order to win out.

I was born and brought up on a Connecticut Valley farm. The land rolled back in the hillsides, and into the rocks and stones, but I never attempted to handle rough land myself until I got into the orchard business some years ago. After I had been in it for some years, I received a letter from a young man, saying he was working in a factory, but wanted to get out into the country; that he loved the land, and loved to watch things grow, and he was positive that if he could get out and get some rough land, and cultivate it, he would win out. I wrote him that if he loved the land, and loved the flowers, and loved the plants and trees, he would win out, but the better the location, the better. Sometime later I heard from him again; he said he had secured the land, and would like to get several thousand young trees, to be paid for by the 1st of July. I did not know the young man,—knew nothing of him except what he wrote—but I liked the way he was going about things, and I decided to let him have the trees. Now, here is the point: On the

24th of June I received a letter from him, asking what on earth he was to do; that he had promised to pay by the 1st of July, and found now he would not be able to do so before the 8th or the 10th of the month. Most men, if they pay any time during the month, think it is all right, but here was this young man, asking what he must do to be saved because he could not meet his obligation on the very day he had said. I wanted to see a man of this kind; he was 65 miles away, but I went, just to see the man. And I was glad I went; he had planted his trees on the roughest land I ever saw, and the rockiest land. No farmer here in Pennsylvania would begin to think of undertaking to plant an orchard in anything like that kind of land. But this young man was hard at work; he was trying to work it in every possible way—sometimes plowing, sometimes grubbing,—cultivating it in every way, and any way he could. It was an eye-opener to me. Here was my opening. I wanted to increase my acreage, and it was practically impossible to get any kind of an orchard down in the valley. And I had before thought my hill lands too rough and rocky. We want the clearest-skinned, and the finest colored peaches and apples, and up there on those hills is the place to produce them. I thought that what this inexperienced man could do, I could, and I really got my first eye-opener to the possibility of planting orchards upon the rocky hills of the northeastern section of the United States, Pennsylvania, New York and New England, after planting largely on rough lands about home and wanting more acreage.

A little later I came upon another question, and that was the selling of our product. I looked up a section of our state where there were some 400,000 people in 5 cities and towns within a 15 mile driving distance of a centre where there was no orchard that could deliver direct. To be able to sell direct to retail dealer or consumer means the greatest profit to the orchardist. But there was no land of easy tillage that I could find that was good orchard land, but there was a hill farm of 100 acres divided into sixteen fields by stone fences; stones in the land by the hundreds of tons to the acre, from a stone as large as a wash tub, down to the size of a water bucket. But the opportunity was there to sell the orchard product if we could produce it. Adjoining these sixteen fields was a brush pasture, 60 acres practically covered with all kinds of trash from six feet high up to 30 or 40 feet. Adjoining this was a larger piece of rocky land, covered mostly with a growth of chestnut timber. This land was put in the tax list at $5 per acre, and the owner swore it was not worth that. When I wanted to buy it, he asked me $20. Where he got this difference I dont' know—yes, I do; it was because it was not the right sort of land for him but was all right for me. He had no faith in the land, and did not expect to make anything out of it, so he thought he would make something out of me while he had the chance. Well, I bought it, and my orcharding friends thought I had gone crazy. They said, "Why, you can't till that land," but I made up my mind that I would take another lesson from my young mechanic. I went to see him, and I made a deal with him, whereby he was to sell his tract, and come over and take charge of that orchard of mine as a sort of partner and foreman.

The first thing we did was to get rid of the stones from those

walled in 16 fields. Where the land was level, we dug ditches and filled in with stones. Then after we turned the sixteen fields into one, we had to dig out a lot more stones and bring them to the surface; we had so many that there was no surface; it was all stones. Then we broke up the land; in breaking it we broke a good many plows, and a good many wagons, and some of the commandments,—not all of them, but some of them, I will admit.

Well, we got it ready, in a very crude way, and planted our apple trees, thirty-six feet apart each way, and peaches in between, and then we began to grub round the trees and cultivate the trees wherever possible, thinking that possibly we might have to use mulch about the trees on the roughest part of the tract; it looked like a big proposition, as we had no cheap mulching material at hand and if we did mulch it looked as though it might be a breeding place for rabbits and mice, and also borers, which we could not get at. So we finally moved those stones little by little, year by year, as we had time, expecting to break a good many tools as we did it, but the land was rich virgin soil that had never been used. The first year's plowing or rather rude attempt at plowing, did not make any show at all, but year by year we have gone over it. Where we could not reach any soil by plowing straight, in rows, we cultivated diagonally, and cater-cornered and every other way. Where we could not get to the stumps we had to dig, use dynamite and do every other thing that could be done. That, of course, left a lot of rubbish on the land that had to be hauled away. That, of course, was expensive, but we saved the expense of the dynamite and stone and stump cartage out of the fertilizer money. The fertility was there in the land, and we did not have to apply it. Where the dynamite broke up the land, it was well broken up, and we started in to plow it; we used very short and stubby plows, and bought them by the dozen, and the parts by the hundred, all costing a lot of money, but I know it has paid us and paid big in annual fruitage of high class fruit.

Later on in another orchard, I had an Italian partner I will tell you about later. I was estimating the first month the cost of the plow bills. They footed up for that month $300, and I went out to give him some sort of a "cussing out." I expected him to get down on his knees, but there he stood, with his pleased Italian smile, and when I had finished he said to me, "You no breaka de plow, de man maka de plow he no have de money to buy your apple and peach." And there is your whole proposition. We are all tied up close together. And all must be doing some business if the other fellow is to succeed. No one can go it alone very long.

Now, to return to this rough land; after plowing it in every possible direction, we harrowed it with an oak beam, a harrow to which was attached teeth of Bessemer steel, and we turned the land a little at a time, turning, rolling and tumbling the stones, and no doubt freeing a little of the potash that we are told is contained in the granite. These things we did for 2 years, and then it got into my head to use spring tooth harrows—the roughest sort of an operation; just like going over your heads, here in this crowded hall, except that the stones are harder than your heads. We kept this up, and at every odd time kept on hauling out stones, until we

feel we have them whipped, and still there are more stones than land show on the surface. We have never attempted to move a stone as small as a man's head. We only pay attention to stones as large as a washing tub or a water bucket, and not much attention to those below the size of a water bucket, because we can get around or over them. Of course, each year we get down into the soil a little farther, and the trees keep right on growing, and at 8 years old the apples are beginning to bear, and I have never seen anything more beautiful than the fruit, which we have received from there for the last 2 years, while the peaches have fruited for 10 years. That orchard has been the laughing stock of my horticultural friends, but the results are coming little by little. If a tree don't grow to suit us, we just grub round it a little more. We keep boosting it, and it comes round. A man said to Pat, "Pat, how about that dog I gave you last year?" Oh, said Pat, "he swallowed the tape measure, and it killed him." "Oh," said the man, "I see; he died by inches." "No," Pat said, "he went back of the house, and he died by the yard." Well, so it is with us finally; we get it first by the yard, then by the tree, and then by the acre. It has been an expensive operation, but on the whole it was a successful one, because I was right there where the people were who wanted the fruit. We got them to come out and see the orchard, and gave them a taste of our nice fruit, and after we got them started we sold it to them; after they were sufficiently attracted, and had admired the beautiful fruit enough and had appreciated its fine flavor enough to ask the price, we told them that we could probably spare a dozen or so one-half bushel baskets for two dollars or two and a half, and they were glad to get them and tote them away without further expense to us. These people paid the bills of the work we had done, and when you don't have to ship away to market, you can make it up so much sooner and easier.

I never lived on "Easy Street," and I never want to, if I can keep my neighbors interested in the game. The peaches in this orchard are now thinning out. We planted this orchard twelve years ago; peaches have recently been stricken with the Yellows and will have to go, and the apple orchard now coming in will have more room and will produce as beautiful fruit as can be produced anywhere in America. Right there where the people have the money to buy, they are ready to pay the bills, and that is a part of my proposition. The rocks and stones on the side hills of this rough land orchard are a protection; there are so many stones there that there is less danger of washing; they simply can't run down hill. I have found it better to till these steep side hills every other row of trees one year, so that every other row gets tilled only every two years. We have used clover and turnip cover crops, although it has given us a great deal of bother; but it has paid us. We have added another farm, making in all about 400 acres that is a beautiful and profitable farm in a section that was a semi-abandoned farm district. It is becoming a stimulus to the entire neighborhood. We set out to do something, and the other fellow has followed. I am satisfied that our rocky lands are those that will give us the highest flavored and most beautiful fruit and the most net profit in the long run.

Then, I wanted to increase my home orchard, and there was no farm to be had except a rocky timbered lot with a road running through it, and another field with an old abandoned apple orchard. By removing the fences and walls we made it into one tract and when we had it cleared we found many chestnut stumps to be blasted out by dynamite. We used the best grade of dynamite that we could buy, and it took large charges to get them out. After going on in this way for a while, I found it would cost me about $200 an acre to get rid of these stumps, I thought it would be better to plant trees in among the stumps. Adjoining this there was another field in which there was a chestnut grove of perhaps 20 years growth. In the summer time when the trees were in full leaf we went in there and felled the trees in full mass, big and small and otherwise. It was cut down in June and July. Then, one absolutely still day in October we started a fire clear round the 75 acres, and in a few minutes we had the whole in a whirling, burning mass, and in one hour and fifty-five minutes it was practically cleared, except some heavy timbers, and then we found we had stumps, with stones between them. We then surveyed it for apples, 36x36 feet, and while we were planting, digging many of the holes with dynamite on account of stones or stumps where trees ought to go, my Italian foreman came to me and said, "Why you no planta de peach between?" I said, "Oh, I don't know about that, I fear land too rough for tillage." Then Pero said, "I worka for you nine years; you giva me one interest in the orchard, and I planta de peach, and make de peach tree grow like hell." I did so, but Pero's hell is always heaven. When he gets anything into the ground he loves it, and he nurses it and he pets it, and just makes it grow; it can't help it with his attention. I made a contract with him whereby he would plant the peaches in with the apples, every fourth tree to be an apple.

It cost a great deal to take out the stumps in the other field by dynamite, but here we had stumps and stones, and I assure you that the stumps are a great deal more serious proposition than the stones. The stones will give up to the spring tooth harrow, but the stumps will not. The first year we tried to start the growth of trees by grubbing round them, and the second year by plowing round them a very little as we could, and then with the spring tooth harrow, a little in one direction, and then in another way, and every way that we could get in between the stumps and the stones, and then we smoothed down the ground, and plowed it again. It takes about two years to do any plowing equal to one plowing on ordinary farm land, but as long as the trees keep growing, it is all right; and every year that they do not grow so well, we find that a little nitrate of potash or nitrate of soda adds ginger to them, and I doubt now if you will find a better 4-year-old orchard of a hundred and fifty acres anywhere. Some work has been going on each year from April until October, and all the time that has not been taken up with culture—that is, October, November and December, we have been taking out the stones. We have occasionally sacrificed a tree for a dump pile where the cost of hauling away was too great. We work it for the stones, but naturally it makes the trees grow more and more, at the same time. Last year we had a little crop of peaches, selling for about $4,000, not quite enough to pay for the

year's culture, but nearly so, and in another year we expect it to do so, and then we have the apples coming on, to last much longer than my natural life time.

Now, in these rough land orchards, it is impossible to drive a wagon among many of the trees, so we have to use floats, or as they are generally called, stone-boats, to haul our stones, fertilizers, spray tanks, etc. As I told you yesterday, we have been spraying all except our largest trees, and expect to continue to spray with the Vermorelle Knapsack Sprayer. Our Italians like it best, and after all, it is results we want. We spray more trees at least cost with this powerful little pump than any other, and have recently imported a fresh lot direct from Vermorelle in France.

Mr. Good.—How do you get the fruit from that farm if you can't get under the trees with a wagon?

Mr. Hale.—Make a few special roads for the wagons and "tote" the fruit by hand to these roads.

A Member.—How much nitrogen for each peach tree?

Mr. Hale.—I don't know exactly; I generally tell the boys to take a good handful, and as Pero has a pretty big hand, and a pretty big heart, and is a pretty good all around fellow, there is no danger that the tree will get too little. About half a pound per tree, I should say.

A Member.—Have you the Yellows in that orchard?

Mr. Hale.—This is a new orchard; only 4 years old; we have not had it there; in the earlier orchard that I speak of, we have it. It broke out two years ago, and we lost about one per cent. of our trees; then about 25 to 30 per cent. were damaged, and last year about 40 per cent. developed, and then we began to weed out the entire orchard, which had, however, been planted twelve years ago, and paid very well. Generally we can keep a peach orchard profitably for from 15 to 18 years.

A Member.—What do you spray for? And what do you spray with?

Mr. Hale.—What for? For the San Jose Scale we spray with lime and sulphur, mostly. Two or three years ago we commenced experimenting with making our own soluble oils; we also tried the commercial oils, but the only one we were in any way satisfied with was the Scalecide. Last year we made all our own oils, according to the instructions given by Prof. Jarvis, of our State College Experiment Station, and they gave excellent satisfaction. This year we shall continue to do this in our apple orchard and use lime and sulphur on the peaches. I like the beneficial results to the tree from the use of lime and sulphur, but I think the oil will kill the scale a little easier. You can spray a little more carelessly with the oils, and still get good results because the oil spreads itself to a

certain extent. The lime and sulphur is the best all around spray for scale and fungus troubles combined, but the oils for the scale alone, are just as effective and much easier to apply.

A Member.—What oils do you use?

Mr. Hale.—One of my own make about the same thing that is recommended by our Storrs Experiment Station. The average farmer in a small way is not always successful in mixing these oils himself, and does not get the results he should. And when to be used in moderate way it will be safer and probably as cheap to buy Scalecide.

A Member.—Still you think it is very easy to prepare?

Mr. Hale.—Yes; I find it so.

A Member.—Have you tried the lime and sulphur put up by the Niagara people?

Mr. Hale.—No; I know nothing about that from actual experience; wherever a man is going to use any quantity, it is, however, surely cheaper to make it than to buy it. They can't make it any cheaper than I can, and by making it myself I save their profit and the transportation on a lot of water. I buy my lime by the carload, and my sulphur by the carload, and so get lowest rates. You of this society should combine and buy all your supplies in large lots.

A Member.—We have used several barrels, and the results have been pretty good.

A Member.—At what season do you spray for the San Jose Scale?

Mr. Hale.—If I could spray when I want to, I would spray about two days before blossoming, but with much to do you can't do that. In the South we spray in the fall—finished this season about the 10th to the 12th of December; in Connecticut we generally commence the latter part of February or early in March, or as soon as it gets warm enough so the men can work comfortably.

A Member.—Do you find any bud damage in fall work?

Mr. Hale.—Never have; no, sir.

Mr. Banks.—Can you make it any stronger than it is generally used?

Mr. Hale.—What do you want it any stronger for? We have experimented with that, and find we get just as good results in killing scale from 12 pounds of sulphur, and 13 or 14 of lime to 50 gallons of water, as from anything stronger, so whats the use

of any extra expense it will do no good, neither will it do harm except to your pocket book.

Prof. Surface.—In view of the fact that it can be applied of different strengths, it may be just as well to say that it does not injure the tree in any form.

Did I understand you to say, sir, that the oil can be handled more carelessly?

Mr. Hale.—Yes; the lime and sulphur will stick right where it is put, but the oil will spread round a little more. It is sort of a mechanical operation. You usually will kill more scale with the oil, because you can cover more of the tree, without being quite so particular in the work of spraying. General lack in thoroughness in spray work, is the leading cause of most failure to kill the scale, no matter what the material used.

Prof. Surface.—That is what I wanted to bring out. I wanted it made clear that it is not a difference in strength, but in the method of applying it.

A Member.—Then you are not acquainted with Scalecide?

Mr. Hale.—Yes; I have used it in large quantities in both Georgia and Connecticut. My only objection to it is that it is not cheap enough to be used on a large scale. I have spoken to my friend Pratt about it, but he says he cannot make it any cheaper, and yet that is the one thing to do to bring it into more general use.

Mr. Banks.—We get the best results from 10 of lime and 10 of sulphur.

Mr. Good.—Does the spray give the same results in Connecticut as in Georgia?

Mr. Hale.—Practically, except that my superintendent has felt that it is rather an injury to the peach trees in the South to use lime and sulphur. We applied Scalecide and lime and sulphur, and got the poorest foliage from the lime and sulphur. I did not want to believe it, and tried to shut my eyes for a year or two, but was finally convinced.

Prof. Surface.—Did it have a fungous effect?

Mr. Hale.—Both Scalecide and lime and sulphur were beneficial except the yellow foliage when lime and sulphur was used.

Prof. Stewart.—What is there about the knapsack sprayer that makes you import it?

Mr. Hale.—Do you know any one in America that makes as good a knapsack sprayer as does Vermorelle in France? It is made of the highest quality of rubber, and material in every way, lasts

longer and works easier than any American made pump I know of. I wish I knew where to get one-half as good a one in America; I would get it here.

Prof. Stewart.—Do you recommend the knapsack sprayer in the hands of any one but an Italian?

Mr. Hale.—Oh, there are heaps of things that I do myself that I would not recommend any one else to do; you see, most of us like to do things our own way, and my Italians are no exception to the rule, and after all, it is only results that I care for.

Mr. Good.—How do you keep these knapsacks supplied?

Mr. Hale.—By hauling a barrow after them, and letting them fill them as needed.

A Member.—What proportion of Scalecide did you use?

Mr. Hale.—I can't remember now—about one part to 18 parts of water I think; I like to mix these commercial preparations a little stronger than the amount that the manufacturers claim.

Mr. Good.—It costs a little more that way, and the trouble is that we always want to keep our expense down and use as little as we can.

Mr. Hale.—I think, Mr. President, that they have pumped me dry.

The President.—I think they have gotten off the question; the question before us is rough lands; if there are any questions on rough lands, we shall be glad to hear them.

Mr. McSparran.—In connection with these rough lands, it seems to me that Mr. Hale could have left those rough hills of Connecticut, and come here to Pennsylvania, where the land is not nearly so rough, and where the conditions are good to make a success of orcharding with less labor.

The President.—What is to prevent him from coming here now? If there are no further questions, we will go on with the report of Prof. Surface.

REPORT ON ORCHARD INSPECTION AND DEMONSTRATION WORK IN PENNSYLVANIA.

PROF. H. A. SURFACE.

(Continued from the morning session.)

Mr. President, Ladies and Gentlemen:

My chief justification in saying anything about this subject whatever, is that these Demonstration Orchards have been estab-

lished in different counties of this State, which show what has been already done, and what still remains to be done in the future, and what results may be expected. Many persons have already seen them, and have seen what has been done; and what has already been done can be done again.

I am surprised at the enthusiasm manifested; I have seen crowds stand for hours in snow and rain, and many of them have followed us from place to place, to try to learn what they can of this work, and these men are all practical men. When we give a demonstration of this kind in a real fruit-producing community, and the attention of the public becomes drawn to this fact, the gratifying result is that almost every time we have larger audiences than previously in the same community. That has been the record ever since we made our first demonstration with a barrel pump and a one horse wagon.

The purpose of these demonstrations is to make clear that pruning is a necessary part of getting rid of the San Jose Scale when the spraying application of the insecticide is made, and that the exact composition of the material (lime-sulphur wash) is not so essential. You may put on boiled lime and sulphur in any way, and you will have satisfactory results, but the best and most economical methods will not come into general use until there are a few demonstrations with the spray pump. For example, there is the one-eighth turn to the nozzle, making it possible to spray three sides of the tree from one position; and one man, who has thousands of trees to spray, has told me that just to learn about this eighth-turn has repaid him for all the time and expense of attending the demonstrations.

Then there are several other topics, such as demonstrations in pruning; it may seem foreign to the subject of scale, but when the matter is thoroughly investigated, you will find that only by pruning properly can the scale be controlled and trees invigorated even by perfect spraying. The scale spreads its injury by injecting its poisonous sap into the growing part of the tree. The results are not so conspicuous at once, but the poison may still have entered the tree to such an extent that nothing but "dehorning" will save it. Pruning will also make it possible to get the nozzle into the tree top in such a manner as to thoroughly spray it. If you will examine Downing or any other authority on pruning, you will find that he says that "pruning is manuring." A man here this morning said he had helped his cabbage plants by the use of nitrate of soda. The same thing applies to trees. The tree plant must be invigorated all that is possible. Now, pruning is not only to remove the dead and superfluous branches but also to remove the serious and harmful effects of the insect that has attacked it and invigorate the tree. After pruning means should be taken to give that tree a good form of growth, such as fertilization and cultivation. Besides spraying, the four essentials to successful fruit-growing are pruning, thinning, cultivation and fertilization, and they are all necessary to a successful control of the scale.

Cultivate that tree from the standpoint of scale control. To show people how to do this it becomes practically necessary for us to go into the orcharding business. This was not our original

intention, but I have seen trees so badly infested with the scale that they were practically dead, yet saved by proper methods. I can show you good trees that would have died if left alone, and yet saved by proper treatment. We found when we took up the subject of pruning that we were engaging in a practical work to which little expert attention had been given in this State. We can't expect a tree to produce good fruit which is in such bad shape that its branches die or leaves become diseased. We obtain the best results from trees that are pruned. Mr. Hale spoke of thinning fruit by means of pruning. We find that necessary. In spraying for the scale, most men have overlooked the necessity of pruning, or have not understood that the one accompanies the other to get good results. *If the tree be infested, destroy the scale, and then keep the tree invigorated until it recovers from the effects.*

We must keep the leaves healthy, and to do this, we must spray with bordeaux mixture. Consequently in our method of demonstrating how to keep the orchard free from the San Jose Scale, it became necessary for us to show how to spray, how to prune, and how to keep the tree invigorated, and the leaves healthy by spraying with the bordeaux mixture. And as one result of our demonstrations, we have found that by spraying with bordeaux mixture so as to keep the leaves healthy, we keep the fruit on the tree longer. Of course, we went a little farther, and demonstrated spraying for the leaf spot and other diseases. It was so easy, just after blossoming, to add a little arsenate of lead for the codling moth,—one or two pounds to fifty gallons of the bordeaux mixture. When we sprayed with the arsenates, such as Paris Green, or arsenate of lead, we found that we not only prevented injury by the codling moth, but that the mixture acted as a fungicide as well.

For spraying for the San Jose Scale, we use home boiled lime and sulphur. It can be used in almost any proportion, but the general formula that we use is 17 lbs. of sulphur, and 22 lbs. of lime, boiled together an hour and then strained and sprayed thoroughly.

We have had some remarkable instances of the efficacy of this demonstration work that cannot be denied. For example, there is Mr. C. C. Gelwicks, a banker of St. Thomas. I heard that he was destroying his fine young apple orchard because it was so badly infested, and I asked him whether he would not hold up until I could give a spraying demonstration there. He had sense enough to see that I could not do any harm, if I could do no good, so he agreed to let me make a demonstration there. I had Dr. Funk go there with a little bucket sprayer, and he gave a public demonstration in methods of making and applying the lime sulphur wash. We sprayed twice that winter. Mr. Kieffer, a buyer, of Chambersburg, said, "I was in his orchard the summer before the demonstrations, and I would not have taken his fruit at any price. Then, I was there the next summer after the two sprayings that winter, and Mr. Gelwicks said he would give me $5 for any scale-marked apple that I could find in his orchard. I went through his orchard, but could not find a single apple that showed any traces of the pest. I went across the way, into a neighboring orchard, and picked up a marked apple, and brought it to Mr. Gelwicks; he looked at the

apple, and said, 'That never came out of my orchard.' I had to confess, and told him that I could not win his five dollars."

Mr. Minnich, another fruit buyer, a neighbor of Mr. Kieffer, went to see Mr. Gelwicks' orchard, and Mr. Gelwicks offered him a dollar for one scale-marked apple from his orchard, if he could find it. (I don't know whether Mr. Gelwicks has any fixed sum, or not; it doesn't look like it.) Mr. Minnich also looked for a scale-marked apple, but could not find it.

Now, if we had not given these demonstrations, what would have been the result? As it is, he is in thousands of dollars, both in the returns from his fruit—especially the Grimes Golden, which is known, I understand, in Chambersburg at the "Evening Party" apple, because it is demanded and served at evening parties—and in his trees.

Now, ladies and gentlemen, we are establishing the county demonstration orchards chiefly in the public institutions of the State because the public has an interest in these institutions, and should have the benefit of any good that can be done them, and again to guard against the charge of favoritism in selecting such orchards, however unjust. I wish to call attention to these demonstration orchards, in order that you may refer to them at any time.

LIST OF DEMONSTRATION ORCHARDS IN PENNSYLVANIA FOR 1908.

Allegheny Co.,	Beechmont Farm and Fruit Co.,	Oakdale, Pa.
Bedford Co.,	County Home,	Bedford, Pa.
Berks Co.,	County Home,	Shillington, Pa.
Bucks Co.,	National Farm School,	Farm School, Pa.
Butler Co.,	County Home,	Butler, Pa.
Cambria Co.,	County Home,	Ebensburg, Pa.
Chester Co.,	County Home,	Embreeville, Pa.
Clearfield Co.,	County Home,	Clearfield, Pa.
Columbia Co.,	Bloomsburg Poor District,	Bloomsburg, Pa.
Cumberland Co.,	Indian Industrial School,	Carlisle, Pa.
Dauphin Co.,	County Home,	Harrisburg, Pa.
Delaware Co.,	County Home,	Lima, Pa.
Huntingdon Co.,	Industrial Reform School,	Huntingdon, Pa.
Indiana Co.,	Frank Daugherty,	Indiana, Pa.
Lackawana Co.,	Randolph Crippen Estate,	Dalton, Pa.
Lancaster Co.,	Home for Friendless Children,	Lancaster, Pa.
	County Home,	Lancaster, Pa.
Lebanon Co.,	County Poorhouse,	Lebanon, Pa.
Lycoming Co.,	City Home,	Williamsport, Pa.
Mifflin Co.,	County Home,	Lewistown, Pa.
Montgomery Co.,	State Insane Hospital,	Norristown, Pa.
Montour Co.,	State Insane Hospital,	Danville, Pa.
Northampton Co.,	Carter Junior Republic,	Redington, Pa.
Northumberland Co.,	Odd Fellows' Orphanage,	Sunbury, Pa.
Perry Co.,	House of Employment,	Loysville, Pa.
Potter Co.,	County Home,	Coudersport, Pa.
Tioga Co.,	George Hatherill,	Wellsboro, Pa.
Union Co.,	J. Newton Glover,	Vicksburg, Pa.
Venango Co.,	Home for Feeble Minded,	Polk, Pa.
Westmoreland Co.,	County Home,	Greensburg, Pa.

Now, my friends, it is my earnest desire personally to attend to the demonstrations in these orchards this year. I am trying to arrange my work so as to spend a great deal of my time in the field this year, and when it is announced in the papers that I will be at a certain demonstration, I will be there, rain or shine. I trust we

will be able to show you something that will be of benefit to every county in the State, and we want every man growing trees to come to these demonstrations. I am sure that if a man came into this State who could teach me something more than I knew myself in regard to anything in my profession, I would make it my business to go to hear him.

Finally, I hope conditions (legislation and appropriations) will come round to where I would like to have them so that we will have in each three counties, one of my men, one man from State College, and one from Washington,—three orchardists competent to help the fruit growers of the State save their orchards,—co-operation of the United States Department, the State Department, and the State College,—who will meet with local organizations all over the State once a month, in order to compare notes. How can we help people unless we know what to do? We are placed here to do service to the public, and are very much pleased with some of the results of our service, as shown here to-day in the interest manifested by the public, and in our Demonstration Orchard Exhibit, by the Inspectors.

Mr. Youngs.—I wrote you a year ago in reference to the material that was put on the market by the Niagara Sprayer Co. At that time you, of course, had not experimented with it, but we wish to know now, what has been the result of your experiments in that line?

Prof. Surface.—Our further experiment with the prepared lime and sulphur wash shows that it is as good a prepared wash as can be gotten. In regard to strength, we have used it 1-8. I have used it recently 1-11, but am not yet ready to report on it. But there is just one word I want to say. In mixing 1-8 you can use cold water for all sprayers but gas, but in using carbonic acid gas pressure always use hot water, as the hot liquid does not dissolve the gas and break up the solution as when cold.

Mr. Youngs.—We have used several carloads of it in my home town.

Prof. Surface.—You used it as a fungicide. In my report I used it for scale, and not as a fungicide.

Mr. Youngs.—We used it also as an insecticide, for the leaf, and we have been able to get good results, but have had some burnings of the leaf. So far as I am concerned, we were careful in using it, and I am rather inclined to speak favorably of it.

Prof. Surface.—I used it for potato blight, and it did not burn the foliage until I came down to San Jose Scale or winter strength.

Our department entered into co-operation with the U. S. Department in regard to the grape-root worm. We sprayed with arsenate of lead at the time the beetles started, and two weeks later; the number of grubs taken from ten vines in starting was 200, and after spraying 25, showing that it is an easy matter to control

it. The United Startes Department saw the necessity of invigorating the plant by every means possible, so we used nitrate of soda, about 400 pounds to the acre, in three applications, with the best results in fruit.

Mr. Eldon.—Professor, what was the proportion of the prepared lime and sulphur wash?

Prof. Surface.—One to eight, of the commercial. I do not think it can be made strong enough to hurt the plant, unless you spray when in leaf.

Mr. Eldon.—Is one to eight strong enough to kill the scale?

Prof. Surface.—Yes, sir.

Mr. Eldon.—Well, I used it on peach trees, and found it was not strong enough.

Prof. Surface.—What power did you use?

Mr. Eldon.—A hand pump.

Prof. Surface.—There is no objection to that if the spraying was properly done.

Mr. Eldon.—I was there myself and I know it was. I made a thorough spraying with the lime and sulphur, and I know it will not kill the scale at that strength.

Prof. Surface.—I used it only once; that was in January of last year, and I have seen that 1-10 of the prepared wash is not as strong as the home boiled 17-22.

Mr. Fox.—About a week or two ago Prof. Surface sent out a warning in regard to the Brown-tail Moth; how did you find it?

Prof. Surface.—I am glad you called my attention to that; it is one of the most important subjects to come before the meeting. The San Jose Scale, as compared with the Brown-tail Moth, is but a shadow as compared with the substance. It will eat the leaves off practically every deciduous tree, and the hairs of that moth will drop down, and as they are poisonous; you will see pedestrians going along, scratch, scratch, scratch. It will give every man, woman, child, dog and horse the "itch." Beside it, the San Jose Scale is but a shadow. It lives in winter in little tents on the branches of the trees as young larvæ. There has been an unusual importation of it this year on the stalks of French seedlings and roses, particularly the stalks on which the finest roses are grafted. In Massachusetts they appropriated $300,000 last year to fight the Gypsy Moth, and they also appropriated $30,000 extra to bring in parasites to stamp it out. That simply shows to what extent these ravages can go. If you see any little bunches or tents, like the tents of the

caterpillar, destroy them immediately by burning. It is the best and simplest solution of the case. They will also be killed by any of the arsenical sprays.

Mr. Good.—There is a small worm that bores in the grape, just as it is ripe. What is that, and what is to be done for it?

Prof. Surface.—That is the Grape Berry Moth. Write to the Ohio Experiment Station at Wooster, Ohio, for their bulletin on it. They cover the subject fully. Or, spray with arsenate of lead, 3 pounds to the hundred gallons.

Mr. Good.—Then there is another insect that attacks the horse-chestnut in Massachusetts.

Prof. Surface.—That may be Gypsy Moth. When it appears in Pennsylvania I will issue a bulletin on it.

Mr. Youngs.—Have you ever had the Brown-tail Moth before?

Prof. Surface.—Not that I know in this State. New York inspectors are finding many of the winter nests now on newly-imported French stock. If it once appears in this State, you shall be told promptly.

Mr. Scholl.—Will fumigation kill this moth on the tree?

Prof. Surface.—I could not say anything in regard to that from my own experiment, but I had a letter from Mr. Atwood, of New York, saying that fumigation will not kill them at the same strength that it will kill the scale.

A Member.—I am very much interested in this discussion; I am from Luzerne County, and we have never had a demonstration up there. We want a Demonstration Orchard started there.

Prof. Surface.—I am glad to see this interest, and to hear requests for demonstration orchards. The only reason we did not visit every county in the State and establish one, is because our funds gave out before we got around. I trust this Legislature will appropriate enough money to enable us to carry on our work in such a manner that we shall have at least one demonstration orchard in every county in the State.

The President.—Are there any other questions to ask Prof. Surface?

A Member.—Is there any fungous that can be introduced into the orchard that will kill the scale?

Prof. Surface.—Attempts have been made in California and Florida to do this, but they have not been successful this far north.

A Member.—I will tell you what happened in my orchard. In looking over my orchard, I noticed that one limb of apples was covered with dark spots. I took an apple off and cut it in two, and found it had dark spots running in to the core. Have you any idea what it is?

Prof. Surface.—That looks like the work of a fungous disease, possibly Bitter Rot, but I could not say positively until I have seen the apples themselves, or the trees. My work, you know, lies in the insects that infect the trees, and I guess I am something like the doctor who, when he was called in to see a typhoid case, and was not sure of the disease, decided to give the patient some medicine that would produce fits, "For," he said, "I'm death on fits." That subject should go to the Plant Pathologist, but if referred to me, I will do the best I can.

A Member.—The spot appeared on the outside of the apple, and went clean in to the core.

Prof. Surface.—What do you think it is? We are always on the watch for new diseases and new insects.

A Member.—I should like to ask what time of the year this disease appeared?

A Member.—In September.

Mr. Youngs.—What was the appearance of the spot?

A Member.—It was dark, like the San Jose Scale.

Prof. Surface.—Probably the Bitter Rot. It occurred in a ring, and that does not look like the Bitter Rot.

Mr. Youngs.—We have the counterpart of that in the grape; that is the brown rot, not the black rot.

Prof. Surface.—Birds-eye rot, is it not?

Mr. Youngs.—Yes.

The President.—If there are no more questions on this subject, we will proceed with the program. Reports of the committees are now in order. Is the Committee on Nomenclature ready to report?

Dr. Mayer.—The Committee on Nomenclature is pleased to present the following report:

Report of Committee on Nomenclature and Exhibits.

Owing to such high average excellence as we find exists here, the committee had some difficulty in making decisions. Perhaps errors have crept in for which we crave the indulgence of exhibitors.

We would recommend the exhibit of the Fruit Growers Association of Adams County as deserving a Diploma for largest and best general or "association" exhibit, with Perry County as second in merit; and the display by the Demonstrators of the Division of Zoology, Department of Agriculture of Pennsylvania, while not so large, was also very fine. Of newer varieties for name we did not find any of more merit than those now in general cultivation.

To R. M. Eldon, Aspers, Pa., is awarded a certificate of merit for best individual exhibit.

Stark Bros. Nursery and Orchard Co., Louisiana, Mo., deserve special mention for best box of apples grown outside the State. Variety, "Delicious," especially fine.

The exhibit of nuts of various kinds was of such character as to show that Pennsylvania can grow fine nuts successfully. The English walnuts exhibited by L. C. Hall, Avonia, Pa., were the largest and finest ever exhibited in the State.

For best plates of apples by individuals the following ar awarded certificates of merit:

S. B. Sheibley, Alinda, best plate Bellflower.
Joshua Kitner, New Bloomfield, best plate Fallawater.
Gabriel Hiester, Harrisburg, best plate Baldwin.
F. H. Fassett, Meshoppen, best plate Northern Spy.
E. E. Rice, Aspers, best plate York Stripe.
C. J. Tyson, Flora Dale, best plate Stayman Winesap.
W. S. Adams, Aspers, best plate Wolf River.
W. W. Boyer, Arendtsville, best plate King.
R. M. Eldon, Aspers, best plate Summer Rambo, York Imperial, Grimes Golden, Smith's Cider.
D. M. Wertz, Waynesboro, best plate Ben Davis.

The following exhibitors made creditable displays of fruits and are deserving of mention. All the specimens were clean, well grown and highly colored:

C. P. Scholl, R. F. D., Halifax, Pa.
Cyrus T. Fox, Reading, Pa.
Fruit Growers Association of Bedford Co., Bedford.
S. B. Heiges, Dorset, Va.
A. W. Griest, Flora Dale, Pa.
H. M. Keller, Gettysburg, Pa.
C. E. Rice, Guernsey, Pa.
H. E. Wolf, Aspers, Pa.
Rufus Lawver, Biglerville, Pa.
J. W. Prickett, Biglerville, Pa.
Abram Hostetler, Johnstown, Pa.
Geo. W. Settlemeyer, Johnstown, Pa.
H. H. Laub, Lewistown, Pa.
J. Hibberd Bartram, West Chester, R. F. D., Pa.
M. R. Good, Narvon, Pa.
R. J. Walton, Hummelstown, Pa.
L. M. Simon, Linglestown, Pa.
D. Z. Detweiler, Belleville, Pa.
Ira J. Light, Lebanon, Pa.
Benj. P. Hooke, Landisburg, Pa.
Dan'l. Anderson, Alinda, Pa.

D. C. Hayes, Alinda, Pa.
Jacob Stambaugh, Alinda, Pa.
Sam'l. S. Kane, Landisburg, Pa.
H. B. Cumbler, Logania, Pa.
Tressler Orphanage, Loysville, Pa.
C. E. Zeigler, Duncannon, Pa.
W. J. Koch, McClure, Pa.
W. A. Lightner, Landisburg, Pa.
S. M. Lightner, Landisburg, Pa.
Wm. Fosselman, Millerstown, Pa.
Dr. J. Fosselman, Millerstown, Pa.
Wm. Stewart, Landisburg, Pa.
P. F. Duncan, Duncannon, Pa.
T. C. Foster, Winfield, Pa.
Oliver D. Shock (English walnuts), Hamburg, Pa.
J. G. Rush (English walnuts), West Willow, Pa.

Prof. Watts.—I would like to say just a few words concerning the Delicious apple. It might add to the interest here to know that it has been found at the Geneva Experiment Station, N. Y., that the Delicious apple grown at Geneva is a better product than the Hood River Delicious; now, it is possible that we can grow the Delicious in Pennsylvania as well, and make it better than the Hood River Delicious.

Mr. Youngs.—Not to take up too much time—I had occasion several years ago to invest in the "Golden" Plum. It is a Japanese plum that has done good in some sections, but not with us. So there are many other fruits that are local, and will not do so well in Pennsylvania. Let us find out what will do best in our localities, and stick to that. I would suggest that we go lightly in recommending any fruits as standard fruits that are not thoroughly acclimated.

Mr. Good.—There is a season for the Delicious apple; perhaps this is not the proper season.

Mr. Youngs.—I think the proper season is the propogating time.

The President.—I want to announce the following committees which I omitted this morning:

Legislative Committee.
Hon. W. T. Creasy, W. F. McSparran and James Bergey.

Allied Agricultural Societies of Pennsylvania.
E. C. Tyson, R. M. Eldon and E. B. Engle.

Chairman of General Fruit Committee.
J. D. Herr, Lancaster.

The President.—Is the Committee on Resolutions ready to report?

Mr. R. M. Eldon.—As chairman of the Committee on Resolutions, I beg to submit the following report:

Report of the Committee on Resolutions.

WHEREAS, Mr. Enos B. Engle has served this Association most faithfully and conscientiously for the long term of thirty-five years, and

WHEREAS, He feels it imperative that he lay down the work at this time;

Be it resolved, That the warmest thanks of this Association be extended to Mr. Engle for his long and faithful service, and that we express herein our sincere appreciation of his unselfish and conscientious work.

Resolved, That the committee representing the Horticultural Association in the Allied Agricultural Organizations, be instructed to promote the development of horticulture at State College, including a soil survey in its relation to fruit and vegetables.

WHEREAS, The horticultural interests of Pennsylvania are rapidly becoming a prominent factor in the wealth of the State, and believing that the State Horticultural Association can be a great power for good in advancing and guiding this work, and

WHEREAS, Its usefulness in the past has been very much limited by lack of funds,

Be it resolved, That this Association do respectfully petition the Legislature of the Commonwealth of Pennsylvania to appropriate through the Department of Agriculture the sum of $2,000 for the furtherance of the work of this Association for the ensuing two years.

WHEREAS, There are in the United States numerous conflicting laws specifying the legal capacity of a bushel, a box and a barrel of apples which are a hindrance to interstate and foreign commerce, and

WHEREAS, There has been much just complaint from consumers regarding the grading and packing of American fruit that has seriously affected the market at home and abroad, both by decreasing consumption and increasing competition from sections which, because of stringent laws, enjoy the confidence of the buyer, and,

WHEREAS, There is now before Congress a measure known as the Porter bill which has for its aim the correction of these adverse conditions; therefore,

Be it resolved, That this Association, while not agreeing with all the details of the bill in its present form, is thoroughly in sympathy with its general aim, and

Be it further resolved, That the chairman appoint a committee of two to confer with similar committees, which are being appointed by other horticultural associations throughout the United States at a meeting to be held at the Raleigh Hotel, Washington, D. C., January 27, 1909, and

Be it further resolved, That this committee be instructed to secure, if possible:

1st. The establishment of a legal capacity for a bushel, a box and a barrel of apples, when packed for interstate and foreign shipment, same to be stated in terms of cubic inches, the growers to have the privilege of using a package of different capacity provided the actual content is plainly marked on the package.

2d. The adoption of a standard grading of the fruit, and marking of the package in accordance therewith.

3d. Requiring that the name and address of the packer or the person in whose interest the packing is done, be plainly stamped upon every package before it leaves his possession.

4th. Providing suitable penalties for the violation of the law and designating proper channels and appropriating sufficient funds for its enforcement, and

Be it further resolved, That should this bill in its final form be referred to this Association for approval before next meeting, the Executive Committee be empowered to take action and, if its verdict be favorable, the Corresponding Secretary shall inform our Senators and Representatives of our action and demand their support of the bill.

WHEREAS, There has been in the past and still is a vast amount of Paris Green, arsenate of lead and other forms of arsenical poison which is being sold to fruit growers in an adulterated form which makes it either ineffective or positively dangerous and

WHEREAS, There is now before Congress a bill known as H. R. 21318, entitled "A bill for preventing the manufacture, sale or transportation of adulterated or misbranded fungicides, Paris greens, lead arsenates and other insecticides, and for regulating traffic therein and for other purposes," a copy of which is hereunto attached; therefore,

Be it resolved, That this Association approves this bill and demands its passage and that the Corresponding Secretary be authorized to forward copies of this resolution to our two Senators, to each member of the House from Pennsylvania, and to Mr. H. F. Baker, care Thomsen Chemical Company, Baltimore, Md., Secretary of the Executive Committee of Entomologists and Manufacturing Chemists having this bill in charge.

Resolved, That the thanks of this Association are due to the Stark Nursery Company, of Louisiana, Mo., for their donation to the Association for distribution at its meeting of two boxes of fine apples, named Delicious.

WHEREAS, Through the death of Mr. B. K. Johnson, the horticultural interests of the State have lost a valued worker,

Resolved, That this Association express to the family of the deceased and by placing this resolution upon the minutes of this meeting, its sympathy and its sense of loss.

WHEREAS, Henry Ort, of Mifflin County, an early member of this Association, and for many years an active worker along horticultural lines, has been called to a higher reward.

Resolved, That we hereby express our appreciation of his work and our realization of the loss we have sustained.

All of which was duly considered and the resolutions approved by vote of the Association.

In Memoriam.

Mr. Fox offered the following which received the approval of the Association:

This Association mourns the loss of two of its Berks County members, James N. Ermentrout and John C. Hepler, both of the city of Reading, where they were born. The former was a life member and at the time of his death was President Judge of the courts of Berks County. He was "A man among men," honored and respected by everybody and beloved by the members of the bar who practiced before him. In the twenty-two years that he served on the bench he was noted for his urbanity of manner and promptness in the despatch of business. He took a deep interest in the promotion of agriculture and horticulture and his death was a distinct loss to this Association. John C. Hepler, was, when he died, superintendent of the Charles Evans Cemetery, one of the most beautiful resting places of the departed in this country. The deceased was brought up amid fruits and flowers, his father having been a pioneer gardner and orchardist. For a number of years John C. Hepler took an active part in the proceedings of the Horticultural Association and attended the meetings. As a public-spirited citizen, active church worker and man of affairs, he occupied a conspicuous position among his associates.

The President.—We should now like to have a few words from our retiring Secretary, who is about to close his labors among us.

Mr. Engle.—I don't know, gentlemen, that I have much to say, I am sure. I want to thank you very cordially for all the kindness I have received at your hands all these years during which I have acted as your Secretary. Nothing has touched me more than your kind expressions of good will.

Mr. Fox.—Mr. President, I have spoken at different times during this meeting. I don't want to take up too much time, but in listening last night to the reminiscences of Prof. Heiges, I noticed some names that might have been mentioned. There was Jacob Stauffer, Botanist, S. S. Rathbun, Entomologist, Jacob Lauder, a fruit grower, all of whom, with Dr. Eshleman, took an active part, and a true interest in the work of the Association. They were among the good friends who came to our first meetings, and I certainly felt, in listening to Prof. Heiges, I could not but feel—how many, many, have passed away. Of course, I am still a young man, but I can still look back to 1871, when I first joined the Association, and in 1882 I was writing up the meeting of the Association for the Reading Times and Dispatch, of which I was then the city editor, and I am glad to be here to-day as the representative of the Reading Eagle. I am sorry that we do not have a bet-

ter representation of the press here to-day. There is a great deal that is sent out by the Department of Agriculture at a meeting like this that should be sent out through the papers, and brought before the people. Full reports of our meetings should be published in the papers of Harrisburg, Reading, Hamburg and Lancaster, and other places where there are fruit growers. Let us not hide our light under a bushel.

Prof. Stewart.—In our work on scion selection, we shall ve very glad to get hold of scions from trees of known individuality, and if any of the fruit growers here have scions of any of the following varieties from such trees I shall be glad to hear from them. I don't want to go out of the State for them, but it is possible that I may have to. I made this announcement at Lancaster last year, but have had very few responses:

Grimes,
Jonathan,
Baldwin,
Stayman Winesap,
Northern Spy,
Smokehouse,
Rome (Beauty),
Paragon,
Summer Rambo,
Maiden Blush,
Early Ripe,
Williams Red,
Salome,
Esopus (Spitzenberg),
Tompkins' King.

There are fifteen varieties, and we want to know about individual trees of these varieties. This is important now because we have got to get these scions this year. I can go away into other states and find these individuals under certain conditions, but that is not what I want. I want to get them here in Pennsylvania, if possible.

Mr. Youngs.—There are a number of trees grown over on the shore of Lake Erie, and among them one particular tree—the Tree of Hospitality. This tree is always in bearing, and we extend to you a hearty invitation to come over and partake of its fruits. Come at any time, in season or out of season; it has all seasons for its own.

The President.—Now, I would like to hear the report of the delegate from the Adams County Society.

REPORT OF MR. C. A. GRIEST.

Delegate from Fruit Growers Association of Adams County.

The Adams County Fruit Growers Association met on December 15, 16, and 17. We had with us able men from New York, New Jersey, Ohio, and Pennsylvania, who talked to us very interestingly and instructively. The meeting opened on Wednesday afternoon, with the customary devotional exercises, after which Mr. W. H. Black, one of our own members, read a very important paper giving an account of our work throughout the year. Prof.

Baker, of State College, talked to us on the subject of Forestry; he made a very strong plea for the preservation of our forests, and urged that every person who had a piece of land without any natural growth, plant some trees there, and thus get some forest growth all over the country. We have a great deal of land in Pennsylvania, which, as Mr. Hale would say, we are too tired to work; that land could be successfully used for tree planting. Mr. Jos. Barton, of New Jersey, presented the subject of peach growing, but what he said has been pretty well covered in the different talks during this session. There are certain things in peach growing with which every person has to contend—such as "Yellows" and "Little Peach." We have heard a great deal about the "Yellows" and borers, and mice and scale, pruning orchards and other things that are necessary to successful peach growing. Pruning is as necessary for the peach as it is for the apple, and right here it is, it seems to me, that peach growers make their mistake. Every one knows that it is the new wood in peach trees that produces the fruit, and Mr. Barton made the statement that you should have a new peach tree every second year. That is, cut away about half the wood every year. It is a simple matter of going over the tree, and taking away practically one-half of the wood that is on it at the time. In New Jersey they prune in the winter time with the pruning shears. Mr. Horace Roberts, of New Jersey, then presented the subject of "Chestnuts." Don't understand me to say that his talk was a "chestnut;" it was not by any means. He gave us a very interesting and instructive talk. He said the chestnut could be grown well in rough land. Mr. Catchpole of New York, spoke of the utilization of the cull apples. I know that in our county of Adams, the cull crop is five or six times what it should be. Mr. Catchpole said that the only right way to settle the cull question was not to have any culls. Why can't every one of us have our ideal set so high that we will cultivate and prune, and look after our crops until we get only good apples? Get them so uniform in size and color that you have no cull crop. But of course, we do have cull apples, and I am afraid we will continue to have them for some years to come. The best way of disposing of these culls is probably by evaporation, or vinegar, or sending them to an apple-butter factory. The next period was occupied by Mr. Cox of the Ohio State Horticultural Association, on the general subject of apples. That was a very large subject, and went all the way from starting the orchard to getting the fruit to market. He emphasized getting plenty of humus into the soil, to retain the moisture there. The hills of southern Ohio are very steep, and they have considerable difficulty in keeping soil on them, so he mulches. One subject that should be thoroughly emphasized at our meetings is that of the necessity of spraying. Inquiry was made of Prof. Surface here to-day what to spray with. You want to know what to spray for, as well as what to spray with, and then when you spray, spray throughly. It is a waste of time to go over an orchard and spray it in a poor way. You don't kill the Scale, and you don't kill the Codling Moth. Of course, the tree will last a little longer, with poor spraying, but you will eventually have to cut it down unless the spraying is thoroughly done. Another thing Mr. Cox said they were doing in Ohio

was a later spraying with lime and sulphur after the leaves were out on the trees. They claim it is better than the bordeaux mixture, and can be applied with perfect safety. Prof. Stewart then gave us a very interesting talk. I believe I won't say anything about it, because he pretty well covered the same ground here.

Prof. Wilson, of Cornell, then showed some charts illustrating the results obtained from cultivation, from pasture orchards, and also the results of sod treatment. The charts of sod v. tillage, of course show that tillage had greatly the advantage, and where hogs, sheep and cattle had been pastured in the orchard, it showed that the hogs were preferable to anything else. I believe that lots of labor can be saved by turning hogs into an orchard; they will keep the soil pretty well turned up. Mr. Roberts told us how crops can be grown profitably in a young orchard. It was just as Prof. Watts told us about it this morning. He says no grain should be used in the orchard, except possibly corn the first two years after it had been planted; no kind of grain at any other time, peas and beans, cabbage and asparagus and plants of that kind are right. The last period of the last afternoon was occupied by Mr. Richard D. Barclay on the relation of bee-keeping to orchard culture. He showed that it was necessary to keep bees in close proximity to the orchard. In very many instances the bees have been a great help.

We had three evening sessions, which were principally entertainment, planned to interest the greatest number, not necessarily fruit growers. The last evening was a lecture by Prof. F. H. Green, of West Chester, which was in a measure entertaining, but was full of good lessons. We had good music each evening.

The President.—I am glad to hear such a good report of the meeting of the Adams County Society. You see they are able to hold a three days' institute there, they must have more money than we have in the State.

Now, as announced this morning, the Cambria County Society has been organized with 108 members, 14 of them ladies; if Mr. Hostetler is in the room, we should like to hear from him in regard to this society. It appears that he has gone. We will then be glad to listen to Mr. Fassett while he tells us what they are doing up in Wyoming County.

Prof. Watts.—I want to say for the Cambria County Society, that although it is newly organized, they mean business over there, and you will hear from them later.

Mr. Fassett.—It gives me great pleasure to come down here to the meeting of the State Horticultural Association. I have enjoyed this meeting very much, and have also gained some very good points.

I want to report to you what we are doing for horticulture. We have land in plenty, and when it is all planted in apples, it will take first rank in wealth with Lancaster. So, I think, worthy fellow-members, that you could do us a good turn by bringing some of the enthusiasm of this society up to us by meeting with us the next time. We have a local society, which has had a number of meetings, and we are going right on. We mean business, the same as

they do in Cambria County. We have done some things and expect to do more.

Dr. Mayer.—I wish the gentleman would take time to tell us about the man who has sold his farm in one of the far-famed western orcharding sections, and bought one up in Wyoming County.

Mr. Fassett.—I don't know anything about it.

Mr. E. C. Tyson.—In a recent edition of the Rural New Yorker, some one asked the name of the gentleman who had sold his farm in Oregon, and moved to Pennsylvania, so there must be some foundation of fact in the story.

A Member.—The gentleman's brother is right here.

Prof. Surface.—And is one of my demonstrators, and I am not ashamed of him, either.

The President.—I wish he would tell us about it.

Mr. Knuppenberg.—I don't know that there is very much to tell, but I will do the best I can. My brother lived out on the Hood River, between Oregon and Washington, and was raising apples on land that was worth all the way up to $500 an acre. He was doing well, but he made up his mind to come back to Wyoming County, where land was not anything like so high, and where he could make a little more money. I have traveled through that fruit country myself, and, in fact, all over the West, and I believe I have seen as fine fruit here to-day as I have ever seen anywhere in the West.

My brother sent me the money to buy him a farm. I thought that was rather an undertaking, but he had sent me the money, so I went ahead and bought as I would buy for myself. I bought for him 260 acres, and he came along with a few horses, and a carload of stuff that he wanted to keep, and set his orchard with one year old trees about two ft. high, and you would be surprised to see how they have grown this year.

The President.—A few years ago it was decided that each member should try to bring another, and a gentleman said that without any inducement to offer, that was a pretty hard thing to do. I see he is here to-day with his wife, but he has left his seven daughters at home; now, I want him to tell us why a man should bring his wife, and leave his daughters at home.

Mr. Scholl.—Mr. Hiester told us several years ago, when we left, to come back the next time and bring new members with us. I asked him what inducement we had to offer a man to come here and pay his dollar. He said, "We'll send him the report of the society, and that is valuable." I told him they would have to have a better inducement than that to induce our Dauphin County farm-

ers to come here and pay their dollars, and then wait two years on the report. I have not heard anything of it since, but if I have never done anything else, I have induced the society to get out a report every year. We don't have to wait two years now.

The president wants to know why I brought my wife, and left my daughters at home. Last year I took my daughter to Lancaster, to the meeting of the society, but she, and her friend, were the only two women present at that meeting. I think that is wrong. My children are all interested in horticulture, and I think that every one of us should bring our wives along, and our children, too, when we can. If the women take hold of our meetings and work them up, perhaps we can get better meetings. Then, we will let Mr. McSparran bring his wife along, too.

Mr. McSparran.—I want to say to Mr. Scholl, that if we want to help get up an interesting meeting, he shall let "the old woman" stay at home, and bring his girls. Where the girls are, the boys will be, too, and then we will have an interesting meeting; we want all the young blood we can get.

But I think Mr. Scholl is mistaken about his daughter and her friend being the only women present at the meeting at Lancaster last year. There were several other ladies present.

I think the least this society can do is to make the wives of the members present, and all ladies attending our meetings, honorary members.

Mr. Engle.—Just a word in regard to Brother Scholl's statement about having to wait two years for the report of the society. Our reports were printed for us by the State, with the State reports, for it is only with the assistance of the Department of Agriculture that we can get them out. The last few years we have been able to do better. Last year we got the report out in June, and this year I expect to get them out in March or April. We will not have to wait on the State Printer.

Mr. Eldon.—Concerning the new local societies that have been organized, bring them in to us, and go on organizing others. We want a little noise; don't let it die out. Try to get new members; I tried to follow out the suggestion regarding new members; I did not succeed in bringing the member, but I brought his dollar, which is almost as good. Now, let us try to unite all these county organizations, and get six hundred members. I like one thing about these county organizations. Each one does the best he can, and if the other fellow beats him, it is all right; he simply goes at it and tries again the next year, and unless we adopt some of this enthusiasm we will go along in the same old way. Now, I am in closer touch with the Adams County Association than I am with the State Association, and I am not ashamed to come here and tell of their enthusiasm; I think it would be a good thing if we could get more of it in here.

Mr. Scholl.—I think the Secretary will vouch for the fact that I have talked the Association up in the upper end of the county;

I have tried for fifteen or eighteen years to get new members, but have never been able to induce them to come in. I tell them to come and listen for themselves, and I think I am right. I know, and you know, that the talk we get here is worth more than all the bulletins.

The President.—I had an object in stirring Mr. Scholl up, because when I stirred him up a few years ago, he stirred the rest of us up. As I suggested yesterday, we should have a three days' session. We can't do what we want in two days. I think the members should come and bring their wives along, and then we can have at least one session devoted to their interests. I trust that in another year we can get the ladies here, and secure a great deal of good to the home and to the school and to the farm, as the result of their meeting with us.

Mr. Creasy.—I would like to make a suggestion. In the first place, publish the time and place of the meeting in all the Agricultural papers of the State, and then in the daily and county papers all over the State. I missed the meeting last year because I was not informed as to the date. Then, as to the reporters, if we can get them interested and satisfy them that it is to their interests to get an account of our meetings in their papers, they will come. Now, take such papers as he "Farm Journal" and the "Grange News"—they should publish a full program of the meeting before it is held, and a full account of the proceedings afterward. And the same thing applies to the daily papers.

Mr. Engle.—Mr. Chairman: I just want to say in reply to the gentleman, that when I got up this program, I sent 150 copies to the daily papers throughout the State, everywhere, and even took the time to write to them requesting them to print it. Only one of them sent me a marked copy; that was one of the Chambersburg papers; one or two of the others made a small paragraph. I sent them to the papers here and gave them due notice of the meeting. I don't recall that the Philadelphia papers gave us a single notice. I also sent this program to the American Agriculturist, the Rural New Yorker, and the Country Gentleman. I didn't even presume to mail it with a 1 cent stamp attached; I wrote a little notice and placed a 2 cent stamp on the envelope. I have done all that I could to advertise the meeting.

Mr. Creasy.—I did not mean to reflect on the Secretary in any way. I simply want to tell you how to get around that. I know how hard it is to get the papers interested. Get your members in different sections of the State to take it up with the papers in their communities; send a committee to interview the editor, and make him understand that it is to his interest to publish these proceedings. It can't be done from a central point by mail. But let every member constitute himself a committee to interest the papers of his community in it, and the thing is done.

The President.—It is only fair to the American Agriculturist and the Country Gentleman to say that they have their reporters

here. The thing we want to talk up is how to get the daily papers interested.

Mr. Creasy.—I think we should extend a vote of thanks to the Reading Eagle, and any other paper that has a representative here to report our meeting. I make a motion that the Reading Eagle, the American Agriculturist, and the Country Gentleman be tendered a vote of thanks.

This was amended to cover all periodicals represented here and was duly carried.

Mr. Fox.—I don't want to stand up in defence of the Reading Eagle, but it prints more of our proceedings than any other paper. But a mere printed program is not the thing that will interest our papers in our meetings. Send a personal letter to the editor, asking him to publish in full the account of the meeting, or at least some notes. Get the members in different parts of the State to see the editors and have them publish it. Now, I am a newspaper man of forty years' standing, and know what I am talking about. The Farm Journal, the Practical Farmer, the Southern Planter, of Richmond, and the National Stockman and Farmer will all publish the reports of this meeting. I will attend to that.

Mr. Jamison.—We have one paper in Juniata County that published the program in full.

Mr. Sheibley.—I am from Perry County, and I want to say that the Perry County papers have published the program in full; I attended to that myself. I want to say that the first time I came to these meetings, I brought a plate of five apples; the next time, at Lancaster, I brought five plates; this time I brought that table full there at the end, with the assistance of a few friends. It came in at the eleventh hour, but it is here all right. I could not bring my wife, because I have none but I am getting some of the neighbors interested.

The President.—I am glad to hear from you, and glad to know that Perry County is falling into line so nicely.

Mr. Eby.—I, too, represent Perry County, and I also went to our newspaper publishers and requested them to publish the program, which they did.

Mr. Engle.—Just one word in regard to Perry County. One of our demonstrators, Mr. Foster, has been at work throughout Perry County, and has used his influence towards having the papers publish in full the program of this meeting. The papers of Perry County have been very faithful in that respect, due largely to the efforts of Mr. Foster and these gentlemen.

The President.—The Secretary has a letter from Prof. Craig, which I will have him read at this time.

The Secretary thereupon read a letter from Prof. John Craig, of Cornell, Secretary of the American Pomological Society, asking that we appoint delegates to a meeting of that organization to be held at St. Catharines, Canada, in September, 1909.

The President.—Do you care to take any action on this letter?

Mr. Creasy.—I believe it would be advisable to appoint delegates in case some one should wish to go, and I make that motion.

The President.—It would be at their own expense, you know.

Mr. Creasy.—At their own expense, of course.

The President.—It has been moved that the President appoint delegates to the meeting of the American Pomological Society at St. Catharine's, Canada. The great trouble is that the meetings are always held at our very busiest time. I have been a member for twenty years, and have never been able to attend a meeting. Is this motion seconded?

The motion was properly seconded and carried.

The President.—I will try to get some delegates to go there; I would like to go myself.

Before we adjourn, I want to make an announcement in regard to the fruit; the fruit on the table of the Adams County section has been donated to State College for use in the classes there. The members will please remember that, and not remove any of it.

Prof. Watts.—We had a very enthusiastic session in horticulture during Farmers' Week up at State College, and before the next Farmers' Week, we hope to be able to have the lectures in our new horticultural building, and in connection with them to have a display similar to the display here, only with each variety grouped separately; for instance, the Ben Davis group by itself, and the Winesap, and so on. It will be a strictly horticultural exhibit, and we would be glad if as many of the members here as possible will send us of their fruits to be exhibited. If they will send them to me at State College when they harvest the apples, I will put them in our storage house up there at the college, and see that they are properly placed when the time comes.

Prof. Surface.—I would like to say that there are some of the exhibits from our Demonstration Orchards to the right of the door as you go out.

The President.—Is Secretary Critchfield here?

Mr. Engle.—Inasmuch as you have called on Secretary Critchfield, and he is not in the room, I want to say that he has expressed the deepest interest in our work, and it is only by his assistance that we have been able to publish our report every year; he is not

always with us at our meetings, but he shows his interest in a substantial way, although it must be done indirectly. He takes the deepest interest in the continuation of our work.

The President.—I see Dr. Hunt in the room; we should like to hear from him.

Dr. Hunt.—I certainly could not expect to take up your time at this time of night. I will merely say that I am glad to be here, and glad to be able to stand on the floor of the Horticultural Association, representing the second highest state in horticulture. I am very glad to note, as I passed in and out the last two days, and the last two years, that the agriculture and horticulture of Pennsylvania is coming into its own. I have abounding faith in the agriculture, the horticulture, and the market gardening in this State. I have the utmost faith, because I see the possibilities; and while it is all right to have the possibilities, you must have some one to take hold, and the signs of life and growth in the State Horticultural Society give me warrant to believe that we are going to make Pennsylvania the leading horticultural State of the Union.

The President.—Any other business?

Mr. Fox.—I move we adjourn.

This motion was properly seconded, and carried and the Fiftieth Annual Meeting adjourned.

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PROCEEDINGS

of the

State Horticultural Association

of Pennsylvania

for 1910

Fifty-first Annual Meeting

Tunkhannock, January 11, 12, 13

PROCEEDINGS

OF THE

State Horticultural Association of Pennsylvania

TUNKHANNOCK, WYOMING COUNTY

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James G. Leighton, ... Tunkhannock.
D. A. Knuppenburg, ... Lake Carey.

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Briggs, J. S., Norristown, Montgomery Co.
Brinton, Samuel L., West Chester, No. 10, Chester Co.
Brinton, William H., Parkesburg, Chester Co.
Brooke, R. G., Schwenkville, No. 2 Montgomery Co.
Brown, M. B., North East, Erie Co.
Brunges, Howard F., Tunkhannock, Wyoming Co.
Brunges, Hon. Stanley, Tunkhannock, Wyoming Co.
Bucher, Dr. I. Riley, Lebanon, Lebanon Co.
Bucher, Floyd S., State College, Centre Co.
Buckwalter, Silas K., Lancaster, No. 8, Lancaster Co.
Bullers, A. J., Brookville, No. 6, Jefferson Co.
Bullock, W. H., Honesdale, Wayne Co.
Burgess, C. L., Lovelton, Wyoming Co.
Burnley, William, North East, Erie Co.
Butt, G. Will, North East, Erie Co.
Butt, J. L. Gettysburg, Adams Co.

C.

Carnahan, Dayton, North East, Erie Co.
Carr, E. E., North East, Erie Co.
Case, B. J., Sodus, N. Y.
Catchpole, E. W., North Rose, N. Y.
Chapin, Irvin, Shickshinny, Luzerne Co.
Christman, James M., Fort Hunter, Dauphin Co.
Claar, William, Queen, Bedford Co.
Cocklin, E. H., Siddonsburg, York Co.
Cope, Joseph, Westtown, Chester Co.
Coursen, I. H., Wyoming, Luzerne Co.
Couse, Norman W., North East, Erie Co.
Coward, E. H., Pittston, Luzerne Co.
Craig, John F., Sligo, Clarion Co.
Crawford Bros., North East, Erie Co.
Critchfield, Hon. N. B., Harrisburg, Dauphin Co.
Cumbler, H. B., Logania, Perry Co.
Cummings, R. M., Montandon, Northumberland Co.

D.

Davis, David, North East, Erie Co.
Davidson, R. A., North East, Erie Co.
Deardorff, Anthony, Gettysburg, No. 5, Adams Co.
Deardorff, J. A., Cashtown, Adams Co.
Deming Co., Salem, Ohio.
Demming, H. C., 15 N. 3d St., Harrisburg, Dauphin Co.
Dill, Robert, North East, Erie Co.
Doyle, George N., Tunkhannock, Wyoming Co.
Duncan, P. F., Duncannon, Perry Co.
Durell, Charles A., Reading, Berks Co.

E.

Eastman, Jas. E., Rome, Bradford Co.
Eichholz, Henry, Waynesboro, Franklin Co.
Ellis, D. M., Bridgeport, Montgomery Co.
Emerson, J. B., M.D., 20 E. 30th St., New York City.
Engle, D. J., Beaver, No. 2, Beaver Co.
Engle, Ezra B., Marietta, Lancaster Co.
Esbenshade, F. L., Refton, Lancaster Co.
Estabrook, F. L., Athens, Bradford Co.
Evans, Earl, North East, Erie Co.

F.

Fassett, F. H., Meshoppen, Wyoming Co.
Fassett, Wallace, Mehoopany, Wyoming Co.
Faust, S. L., State College, Centre Co.
Fenstermaker, P. S., Allentown, Lehigh Co.
Fernald, George H., North East, Erie Co.
Finn, A. O., Clifford, Susquehanna Co.
Force, J. M., North East, Erie Co.
Foster, T. C., Winfield, Union Co.
Frederick, T. J., Springchurch, Armstrong Co.
Freed, A. J., Racine, Butler Co.
Freed, W. A., Racine, Butler Co.
Freer, Edgar, Factoryville No. 3, Wyoming Co.
Fuller, N. P., North East, Erie Co.
Fulton, Hugh R., Lancaster, Lancaster Co.

G.

Garrahan, R. H., Kingston, Luzerne Co.
Garrettson, Eli P., Biglerville, Adams Co.
Garrettson, Robert, Flora Dale, Adams Co.
Gass, W. J., Paxinos, Northumberland Co.
Gay, G. E., Pittston, No. 1, Luzerne Co.
General Chemical Co., 223 Market St., Philadelphia.
Gibson, Ralph, State College, Centre Co.
Gill, J. F., North East, Erie Co.
Gochnauer, J. D., York Springs, Adams Co.
Good, Martin R., Narvon, Lancaster Co.
Griest, A. W., Flora Dale, Adams Co.
Griest, F. E., 3825 Baring St., Philadelphia.
Griest, C. A., Guernsey, Adams Co.
Gross, Joshua W., Harrisburg, Dauphin Co.
Gump, Dr. S. H., Bedford, Bedford Co.

H.

Haines, Miss Mary M., Cheltenham, Montgomery Co.
Harris, Edwin, Aspers, Adams Co.
Harris, Joseph, Shamokin, Northumberland Co.
Harris, Philip, Light Street, Columbia, Co.
Harshman, U. W., Waynesboro, Franklin Co.
Hartley, A. D., Pottstown, No. 3, Montgomery Co.
Hartman, William, Etters, No. 1, York Co.
Hartman, E. V., 625 Linden St., Scranton, Lackawanna Co.
Haskell, J. Wayne, North East, Erie Co.
Henning, J. C., North Mehoopany, Wyoming Co.
Hershey, H. F., State College, Center Co.
Hibshman, George, Ephrata, Lancaster Co.
Higgins, John, North East, Erie Co.
Hinkle, Horace, York, York Co.
Hill, William D., North East, Erie Co.
Howe, H. B., Wellsboro, Tioga Co.
Huber, J. H., Gettysburg, Adams Co.
Hull, D. W., Waymart, Wayne Co.
Hull, Ray W., Waymart, Wayne Co.
Hunt, Dr. Thomas F., State College, Center Co.
Huston, Charles L., Coatesville, Chester Co.
Hutchinson, R. H., 51 Front St., New York City.

I.

Ide, Silas C, Alderson, No. 1, Luzerne Co.

J.

Jacob, P. A., Wellsburg, W. Va.
Jacques, Mrs. E. S., Germantown, Philadelphia Co.

K.

Kane, J. A., Biglerville, Adams Co.
Keeney, A. C., Laceyville, Wyoming Co.
Keeney, Fred. B., Laceyville, Wyoming Co.
Kent, A. H., Cleveland, Ohio.
Kauffman, E. F., York, No. 3, York Co.
Kernan, William, Dushore, Sullivan Co.
Ketchum, E. M., North East, Erie Co.
Kidder, N. A., North Warren, Warren Co.
Kidder, O. S., North East, Erie Co.
Kilmer, A. B., Springbrook, Lackawanna Co.
Klinefelter, U. S., Biglerville, Adams Co.
Kloss, D. S., Tyrone, Blair Co.
Knouss, Francis C., Bethlehem, Northampton Co.
Knuppenburg, D. A., Lake Carey, Wyoming Co.
Knuppenburg, J. A., Tunkhannock, Wyoming Co.
Koons, Dr. P. R., Mechanicsburg, Cumberland Co.
Krady, W. S., Mt. Joy, No. 2, Lancaster Co.
Krewson, James, Cheltenham, Montgomery Co.
Krug, H. G., 203 S. McKean St., Butler, Butler Co.

L.

Laub, H. H., Jr., Lewistown, Mifflin Co.
Lawver, Rufus, Biglerville, Adams Co.
Lee, Ross F., Somerset, Somerset Co.
Leet, Charles A., North East, Erie Co.
Leet, C. C., North East, Erie Co.
LeFevre, T. C., 5104 Brown St., Philadelphia.
Leighton, James G., Tunkhannock, Wyoming Co.
Leonard, Frank E., Carlisle Springs, Cumberland Co.
Lewis, Bradley W., Tunkhannock, Wyoming Co.
Lewis, H. G., Pittston, Luzerne Co.
Lewis, W. J., Pittston, No. 1, Luzerne Co.
Lockwood, Harry C., Mt. Pocono, Monroe Co.
Lohmann, Karl B., State College, Centre Co.
Loomis, Edward, North East, Erie Co.
Luke, C. A., North East, Erie Co.

M.

McAllen, R. W., Fannettsburg, Franklin Co.
McBride, Charles G., State College, Centre Co.
McCanna, F. J., Pittston, Luzerne Co.
McClelland, John B., Cannonsburg, Washington Co.
McCord, F. H., North East, Erie Co.
McDonald, James A., North East, Erie Co.
McDonald, T. M., North East, Erie Co.
McFarland, J. Horace Co., Harrisburg, Dauphin Co.
McGowan, H. G., Geigers Mills, Berks Co.
McLaughlin, Joseph B., North East, Erie Co.
McLaughlin, Joseph M., North East, Erie Co.
McMullen, S. A., Waymart, No. 3, Wayne Co.
McQuitty, A. J., North East, Erie Co.
McSparran, W. F., Furniss, Lancaster Co.
McWilliams, Howard C., State College, Center Co.
MacAskie, Kenneth G., State College, Center Co.
Mackall, R. C., Beaver, Beaver Co.
Macneal, W. H., Parkesburg, Chester Co.
MacVeagh, Walter F., 326 Mulberry St., Williamsport, Lycoming Co.
Maffet, Miss M. A., 262 S. Franklin St., Wilkes-Barre, Luzerne Co.
Martin, Hon. A. L., Harrisburg, Dauphin Co.
Marshall, W. E., North East, No. 5, Erie Co.
Mayer, H. M., Rohrerstown, Lancaster Co.
Mayer, Dr. I. H., Willow Street, Lancaster Co.
Menger, G. E., Factoryville, No. 3, Wyoming Co.
Miller, A. Kent, Somerset, Somerset Co.
Miller, Norman G., Marion, Franklin Co.

Minter, D. G., Gettysburg, No. 5, Adams Co.
Moon, William H., Morrisville, Bucks Co.
Moorehead, E. T., North East, Erie Co.
Moorehead, J. A., North East, Erie Co.
Moorehead, R. J., North East, Erie Co.
Mottier, C. H., North East, Erie Co.
Moxon, J. R., 60 Wall St., New York City.
Myers, Prof. C. E., State College, Center Co.
Myers, George P., Biglerville, Adams Co.
Myers, Levi M., Siddonsburg, York Co.

N.

Nesbit, J. W., Oakdale, Allegheny Co.
Newcomer, Aaron, Midvale, Franklin Co.
Newcomer, W. S., Glen Rock, York Co.
Nissley, A. H., Bamford, Lancaster Co.
Nissley, Walter B., State College, Center Co.
Nix, J. L., Homer City, Indiana Co.
Norris, H. E., North East, Erie Co.
Norton, W. C., Waymart, Wayne Co.
Norton, W. M., Waymart, No. 1, Wayne Co.

O.

Oldach, J. F., North East, Erie Co.
Oyler, George, Gettysburg, No. 5, Adams Co.
Orton Bros., North East, Erie Co.
Ottaway, Frank, North East, Erie Co.

P.

Patterson, James A., Stewartstown, York Co.
Peachy, J. H., Belleville, Mifflin Co.
Pelton, Ward C., State College, Center Co.
Pennock, Edw. A., Chatham, Chester Co.
Persing, E. E., Sunbury, Northumberland Co.
Peters, J. E., North East, Erie Co.
Peters, Earl, Carlisle, Cumberland Co.
Phillipson, George, Tunkhannock, Wyoming Co.
Piatt, F. H., Tunkhannock, Wyoming Co.
Pierce, B. R., North East, Erie Co.
Pierce, George E., North East, Erie Co.
Pollock, G. B., Wyoming, Luzerne Co.
Pratt, B. G., 50 Church St., New York City.
Prickett, Josiah W., Aspers, Adams Co.
Pyle, Josiah W., Kennett Square, Chester Co.

R.

Raffensperger, Charles E., Arendtsville, Adams Co.
Rakestraw, Thomas, Kennett Square, Chester Co.
Reel, George L., 519 Walnut St., Columbia, Lancaster Co.
Rice, Daniel, New Bloomfield, Perry Co.
Rice, Louis S., Scranton, Lackawanna Co.
Rick, John, Reading, Berks Co.
Richards, A. C., Schellburg, Bedford Co.
Rife, Jacob L., Camp Hill, Cumberland Co.
Rinehart, George W., York, No. 4, York Co.
Rinehart, E. S., Mercersburg, Franklin Co.
Roberts, Horace, Moorestown, N. J.
Rittenhouse, Dr. J. S., Lorane, Berks Co.
Robinson, Fred J., Honesdale, No. 3, Wayne Co.
Robinson, Byron H., Meshoppen, Wyoming Co.
Rohde, William, Johnstown, Cambria Co.
Root, A. W., Manheim, Lancaster Co.
Ross, W. H., North East, Erie Co.
Rouf, Fred., Waltonville, Dauphin Co.
Rozelle, H. E., Pittston, Luzerne Co.
Rupp, D. C., Shiremanstown, Cumberland Co.
Runk, John A., State College, Center Co.
Rush, J. G., West Willow, Lancaster Co.

S.

Sampson, H. O., Scranton, Lackawanna Co.
Sangree, J. R., Glenshaw, No. 2, Allegheny Co.
Satterthwait, A. F., 334 Spring St., Middletown, Dauphin Co.
Saylor, J. C., Pottstown, No. 5, Montgomery Co.
Schaeffer, Dr. N. C., Lancaster, Lancaster Co.
Searfoss, W. H., Wyoming, No. 1, Luzerne Co.
Sedelmeyer, L. H., North East, Erie Co.
Selkregg, L. D., North East, Erie Co.
Shalcross, Frank R., Frankford, Philadelphia Co.
Shorb, Albert, Hanover, No. 2, York Co.
Shreve, Hon. Milton W., 562 W. Eighth St., Erie, Erie Co.
Siegler, Edward Horace, State College, Center Co.
Siegler, Franklin, 320 S. 44th St., Philadelphia.
Sloan, E. H., Orangeville, Columbia Co.
Smith, Arthur H., State College, Center Co.
Smith, Guy C., State College, Center Co.
Smith, W. O., M.D., 15 S. Market Square, Harrisburg, Dauphin Co.
Snavely, Henry C., Cleona, Lebanon Co.
Snavely, J. R., Harrisburg, Dauphin Co.
Snavely, M. H., Cleona, Lebanon Co.
Stahle, C. E., Gettysburg, Adams Co.
Stark, O. V., Nicholson, Wyoming Co.
Stein, George E., East Prospect, York Co.
Stephens, A. W., Hebron, Ohio.
Stewart, Prof. John P., State College, Center Co.
Stewart, John W., Martinsburg, W. Va.
Stewart, William, Landisburg, Perry Co.
Stone, B. M., Stull, Wyoming Co.
Stone, H. S., Nicholson, Wyoming Co.
Stoney, R. J., Jr., 424 Fifth Ave., Pittsburgh, Allegheny Co.
Stover, F. S., Bowmansville, Lancaster Co.
Stow, W. L., North East, Erie Co.
Strode, A. Darlington, West Chester, Chester Co.
Stull, James B., North East, Erie Co.
Surface, Prof. H. A., Harrisburg, Dauphin Co.
Swank, Luke H., State College, Center Co.

T.

Taylor, Prof. B. C., Chester, Delaware Co.
Tennant, J. G., Westfield, N. Y.
Thayer, J. C., Tunkhannock, Wyoming Co.
Thomas, Prof. Benjamin F., Lewisburg, Union Co.
Thorpe, Francis Newton, Mt. Holly, N. J.
Treible, C. E., Vosburg, Wyoming Co.
Trostle, F. C., York Springs, Adams Co.
Tyson, A. R., Norristown, No. 1, Montgomery Co.

V.

Van Tuyle, G. M., Pittston, No. 1, Luzerne Co.

W.

Wadhams, Miss L. F., Wilkes-Barre, Luzerne Co.
Wagner, George A., Landisburg, Perry Co.
Wagner, Harry S., Carlisle, Cumberland Co.
Walton, Robert J., Waltonville, Dauphin Co.
Walter, William, Blairsville, Indiana Co.
Weidner, A. I., Arendtsville, Adams Co.
Watterson, W. F., Cleveland, Ohio.
Watts, Prof. R. L., State College, Center Co.
Weaver, Abram, Windber, Somerset Co.
Wells, W. D., North East, Erie Co.
Whitehill & Co., North East, Erie Co.
Wheaton, E. H., Knoxville, Tioga Co.
Wiese, H. B., Parkesburg, Chester Co.
Wilbur, Harry, Bethlehem, Northampton Co.
Williams, J. L., Gettysburg, Adams Co.
Wills, F. A., 1206 Montgomery Ave., Philadelphia.
Wing, W. O., North East, Erie Co.
Wilsey, Riley, Falls, No. 1, Wyoming Co.

Withrow, J. C., Van Port, Beaver Co.
Wolfe, C. A., Aspers, Adams Co.
Woodruff, N. S., North East, Erie Co.
Wright, A. Cooper, Hummelstown, Dauphin Co.
Wright, Prof. W. J., State College, Center Co.

Y.

Yentzer, J. R., Conestoga, Lancaster Co.
Young, Willard S., 218 Briggs St., Harrisburg, Dauphin Co.

MEMBERSHIP BY COUNTIES.

The following list shows the number of Annual and 1910 Members in each county.

This matter of county membership is a perfectly proper field for competition and the officers are glad to encourage friendly rivalry in this direction.

Erie County heads the list this time, but already there are rumors that Adams County will be out for the lead next year. Erie is strong and spunky and the prospect is good for a lively contest. In the mean time it is perfectly possible that Wyoming or Lancaster or Center, with State College to draw on, may beat both. The county that *leads next year* will have a *fine representation* in the State Association; mark my word!

64 Erie.
35 Adams.
25 Wyoming.
24 Center.
23 Lancaster.
22 Dauphin.
15 Chester and Luzerne.
11 Philadelphia and York.
9 Franklin and Montgomery.
7 Wayne.
6 Cumberland.
5 Northumberland and Perry.
4 Allegheny, Berks, Lebanon and Lackawanna.
3 Beaver, Bedford, Butler, Cambria, Columbia and Somerset.
2 Blair, Bradford, Bucks, Indiana, Juniata, Lycoming, Mifflin, Northampton, Tioga, Union and Westmoreland.
1 Armstrong, Clarion, Clinton, Crawford, Delaware, Jefferson, Lehigh, Monroe, Snyder, Sullivan, Susquehanna, Warren and Washington.

ROLL OF HONOR.

The following have qualified for the 1910 Roll of Honor, by securing five or more new members (not renewals), one life member counting as ten annuals. The Treasurer and Secretary are not eligible:

Miss M. A. Maffett, Wilkes-Barre.
H. F. Hershey, State College.
C. G. McBride, State College.
F. H. Fassett, Meshoppen.
D. A. Knuppenburg, Lake Carey.
R. H. Garrahan, Kingston.
D. W. Hull, Waymart.

SPECIAL ATTENTION

at this time, is called to the Constitution and By-Laws, for a complete revision at the next annual meeting is proposed and will be considered.

CONSTITUTION.

Article 1. This society shall be entitled "The State Horticultural Association of Pennsylvania," and its object shall be the advancement of the science of horticulture and pomology.

Article 2. Any person may become a member of this society by a vote of a majority of the members present at any meeting, and by paying into the treasury the sum of one dollar annually; or the payment of one dollar to the treasurer, at any time, shall constitute membership, and entitle said member to a copy of the proceedings. The payment of ten dollars at one time will constitute life membership.

Article 3. Its officers shall consist of a president, three vice-presidents, recording and corresponding secretary and a treasurer, all of whom shall be elected annually by ballot.

Article 4. The following committees shall be appointed: A committee of five on nomenclature; a committee of three on insects, of whom the professor of entomology shall be chairman; an executive committee consisting of the elective officers of this association and three of whom, including the president, shall constitute a quorum; and a general fruit committee, consisting of one from each county represented, with a general chairman of the whole, each member of the fruit committee to have the privilege of appointing two assistants.

Article 5. The society may, at any time, elect honorary members.

Article 6. The society may, from time to time, appoint professors on etomology, botany, horticultural chemistry and geology.

Article 7. This constitution may be altered or amended by a vote of two-thirds of the members present at any regular meeting, notice of the proposed amendment, in writing, having been previously given.

Article 8. Seven members shall constitute a quorum for the transaction of business.

BY-LAWS.

Article 1. The committee on nomenclature shall collate and decide the standard and synonymous names of all fruit known in the society with the authorities for each, and report, so far as practicable, at each regular meeting, and record the same in a book kept for that purpose.

Article 2. The general fruit committee shall carefully and thoroughly investigate the subject of fruit culture in general. Each local committee of three shall collect such useful and interesting information in relation to the subject as may be in their power, and embody the same in monthly reports, to be made to the general chairman; such reports to be by him examined and embodied in his annual and semi-annual reports. Also that the said county committee shall form ad interim committees for their respective counties, and further that said ad interim committees are hereby authorized to publish the reports in the "Gardener's Monthly," or such other paper, as they may select, the same having been first submitted to the chairman of the general fruit committee for his approval: Provided, That said publication shall be free of expense to the association.

Article 3. The annual meeting of the association shall be held on Tuesday before the third Wednesday of January of each year, at such a place as the executive committee may appoint, at which time the election for officers shall take place; said officers to serve from the close of the meeting at which they are elected to the close of the succeeding annual meeting, at which an exhibition and discussion of fruits shall take place and other business transacted in the following order:

1st. Reading of minutes of previous meeting.
2d. Roll call and dues collected.
3d. Election of officers.
4th. Reports of officers.
5th. Reports of standing committees.
6th. Reports of special committees.
7th. Unfinished business of former meeting.
8th. New business.

The nomination and election of new members shall be in order at any time during the session.

Article 4. Other meetings may be convened by the executive committee at such time and place as they may appoint.

Article 5. No member who is in arrears for dues shall be eligible for any office, or serve on any standing committee; and any member who shall neglect to pay his dues shall cease to enjoy the privileges of membership.

PROCEEDINGS

OF THE

FIFTY-FIRST ANNUAL MEETING

OF THE

State Horticultural Association

of Pennsylvania

HELD AT

Tunkannock, Pa., January 11, 12, 13, 1910.

The Fifty-first Annual Meeting of the State Horticultural Association of Pennsylvania convened in the Court House at Tunkhannock at 1.30 o'clock, Tuesday afternoon, January 11, 1910, with the President, Mr. Gabriel Hiester, in the Chair.

The President.—The meeting will please come to order. The first number on the program is the reading of the minutes of the last meeting.

Mr. Eldon.—Inasmuch as the subject matter of the minutes appears in the printed proceedings, I move that the reading be dispensed with at this time.

Mr. Fassett.—I second the motion.

This motion was carried in the regular way.

The President.—The next number on the program is an address of welcome by the Hon. Stanley Brunges.

ADDRESS OF WELCOME.

BY THE HON. STANLEY BRUNGES.

Mr. Chairman and Members of the State Horticultural Association: I have been requested to be brief in my remarks. To this request I shall most cheerfully assent, and promise you that my address will have the merit of brevity. I am entirely unaccustomed

to public speaking. My whole life has been devoted to actual agricultural pursuits, and still is, and I feel unfitted for the position into which I have been impressed.

I feel that perhaps words will fail me in my efforts to express to you the appreciation and profound gratitude of this people, that you have come among us, and in welcoming you to this little town, nestled among the hills of northern Pennsylvania, where for almost a hundred years it has been standing peacefully on the banks of the beautiful Susquehanna, as it flows on to mingle its pure and sparkling waters with the briny ocean. I say I feel unable to express the gratitude of this people, that you have come among us to give us an uplift and an inspiration to higher and better things in the field of Horticulture. We may learn lessons from failures, and often valuable lessons, never to be forgotten, from our mistakes, and in many cases an uplift and a boon comes to us from each others' mistakes and failures. We look to each other from a desire to emulate, and possibly from a desire to excel.

We do not have the broad and fertile fields of southern Pennsylvania, where we might farm for pleasure and grow fruit and grain profitably and easily. Our hills are steep, and our soil less productive. It requires continued and prolonged effort to live comfortably and lay a little by for a rainy day. In this respect we are unfortunate, and yet we try to extract some comfort from the fact that our struggles are crowned with some degree of success. Great achievements are not attained without great effort. History tells us that the communities which struggle to overcome severe obstacles, are the communities which last. History tells us that the communities which struggled with poverty and with adverse conditions are the communities which produced great men. Old Virginia, when she was struggling against great odds, produced her Washington, her Jefferson, and her Patrick Henry. When these severe obstacles were overcome, and she rested from her toil and from her labors, and turned her soil over to the laborers from far-off Africa, she began to fall, and from the point where he began to labor, the black man began to rise.

And this, gentlemen, is one of the reasons why we rejoice that you have come among us, to guide us right, and to encourage us to struggle on until success shall crown our efforts.

When our fathers cleared away the timber to establish the farm, they planted orchards, not for any commercial purpose, but only for their intrinsic value. They did not see any commercial value in them, but they did not consider the farm complete without the orchard. Some of them gave some little attention to their orchards. Many others have been entirely neglected. A neglected orchard has been compared to a neglected farm, and, gentlemen, you can readily see the analogy, because a neglected orchard is not only an injury to itself, but it becomes a constant menace to the whole community. With our Scale, and our lice, and our moths, and all the legion of ills to which our orchards are heir, we can readily see why orchards don't do so well. Our orchards are failures unless we adopt heroic methods and carry them on with expediency and dispatch. We look to you, gentlemen, to interpret for

us the handwriting on the wall, and to give us the instructions that will improve our orchards.

We believe, and we believe that we can make you believe, that we can grow as good fruit, and as good-flavored fruit in little Wyoming County, as is grown in any other section of our State, or of our land. What we need is to take hold and to work intelligently and industriously, and we have that in view.

I desire at this time to express the gratitude of the fruit growers of this section, for the good work, both by precept and by practice, which has been done by our esteemed neighbor and friend, the first officer of this Association, and I desire to say again, in welcoming you, I believe we feel and appreciate the honor and privilege of entertaining the Horticultural Association of the great State of Pennsylvania. We know it will be helpful to us, and we hope that when you come to go away from among us, it will be with the feeling that it was well for you to be here and that sometime, in the not distant future, we may induce you to come again.

And now, in behalf of the fruit growers of this section, and in behalf of the Horticultural Association of Wyoming County, and in behalf of the good people of Tunkhannock, which I think is one of the brightest spots on God's beautiful earth, I bid you a cordial welcome.

To this address of welcome, President Hiester responded as follows:

ADDRESS OF THE PRESIDENT.

By Gabriel Hiester.

I want to assure Mr. Brunges, the members of the Wyoming County Horticultural Association, and the citizens of Tunkhannock, that we are very glad that we have accepted Mr. Fassett's invitation to hold our meeting here. Four years ago, I think it was, I was invited to attend the annual meeting of the Wyoming County Horticultural Association. I met a few men, possibly five or so, who seemed to be impressed with the possibilities of the commercial apple in Wyoming County. There was no interest outside of this, and it seems incredible to me that these few men could in so short a time have worked up a sentiment resulting in this display of beautiful fruit grown right here in Wyoming County, by such a number of individuals, as is shown to-day. When I see it, I feel ashamed that I have not advanced as much as these men in "little Wyoming," as you are pleased to call it.

During the past year the Pennsylvania fruit grower has had a great many unusual conditions to contend with, some of them very discouraging, because they seemed to be entirely beyond his control.

First, we had a cold rain during the blossoming period, which seriously interfered with pollenation and caused a total failure of some varieties, and a partial failure of many others; warm rain at the period of ripening cut down the crop of cherries and strawberries below the point of profitable production, and furnished most

favorable conditions for the development of brown rot in the peach. Then succeeded the longest dry spell we have experienced for many years, during which insects of all kinds multiplied enormously. The apple aphis came in numbers heretofore unknown, and finished his destructive work before we were aware of his presence, and when we asked advice of our scientific men, they replied "It is too late to do anything this season; you may not have another such visitation for many years."

All the Scale insects multiplied in the warm, dry sunshine, without anything to hinder them, and many growers who thought their orchards were perfectly clean, found them badly infested before the close of the season.

And, yet, notwithstanding all these discouraging circumstances, commercial fruit culture has made greater strides in Pennsylvania during the past year than in any one year in its history. This statement is fully borne out by the magnificent display of fruit before us.

Some one said recently in a public address "one of these days Pennsylvania will be discovered by a fruit grower, and then the general market will get some fine fruit." I think this fruit display shows that it has already been discovered by several fruit growers. More counties are represented than ever before; more growers from each county are represented. The fruit, taken as a whole, is more perfect than ever before. The old worthless varieties have been eliminated; the varieties, with very few exceptions, have high quality, and are good sellers in the general market; all of which goes to show that more men all over the State, are seriously studying their business.

We find upon careful inquiry, that during the past year more spray rigs were purchased, and more spraying was done, not only for San Jos Scale, but also for fungous diseases. More fertilizers were used on orchards; more intelligence was displayed in their application; more seed was sown for the various cover crops; more fruit, both apple and peach, was thinned; more *new* barrels, and other uniform *new* packages were used; more care was exercised in grading and packing, and better prices were received than heretofore; more County Horticultural Societies were organized; more members were enrolled in the Association, among whom were a very gratifying number of life members.

The State Horticultural Association is working in harmony with the County Horticultural Societies, with the State Department of Agriculture, and the State Experiment Station. The orchard experiments which are being conducted by Prof. Stewart of the Experiment Station force, are already beginning to show some rather startling results, although they have run only two years, and we hope to derive great benefit from them in the future.

As we look back over the work of the past few years, everything seems to emphasize a statement that has often been made to this Society, namely: "We have all the natural advantages in Pennsylvania for growing fruit of the highest quality, and the best markets in which to sell it; all that we need is *men* properly trained for the work." State College is now prepared to train the men, and Prof. Watts, the very able head of the Department of Horticulture,

is actually engaged in the work. It is exceedingly gratifying to me to note the increased interest in Horticulture since Dr. Hunt was made Dean of the School of Agriculture, and Prof. Watts placed at the head of the Department of Horticulture. Four years ago there were nineteen Agricultural students; to-day there are four hundred and sixty-five, fully half of which are specializing in Horticulture.

Two years ago, during Farmers' Week, forty or fifty out of the four hundred farmers present, came to hear the lectures on horticulture. This year the lecture room was crowded to the door, with a number standing in the hall outside who could not get in. Two years ago one table was sufficient to hold the fruit displayed. This year, tables extending over a space more than one hundred feet in length, were filled with perfect, high-colored specimens of the leading varieties from twenty-one counties, representing sixty-four different orchards.

Altogether, I think we have great reason for congratulation and that we may all look forward with confidence for a very prosperous and happy New Year.

The President.—Next in order will be the Secretary's report.

REPORT OF THE SECRETARY.

CHESTER J. TYSON.

I am glad to report that your Association is in a thriving condition, showing some growth, and we believe, a tendency in the right direction. Effort has been made to secure new members, and more prompt renewals, with the following results:

In 1908 there were 110 paid annual members.

In 1909 there were 302 paid annual members,—119 of them secured through the summer meeting.

And yet with this nearly two hundred per cent. gain, your secretary hesitates to make public these very low figures before the delegates from other States; and does it only with the hope that you may share his shame, and forthwith get busy. An opportunity will be given you in a few minutes, to pay your dues for 1910. Don't let this opportunity go by. Then go after new members; ask your neighbor to join; continue to ask, and show him why, until he gives you his dollar, or mails it to the Treasurer or Secretary.

Through the efforts of Hon. N. B. Critchfield, Secretary of Agriculture, seconded by many members of this Association, the last session of our Legislature appropriated the sum of one thousand dollars for two years, or five hundred dollars a year, as "Aid to the State Horticultural Association." This is nearly fifty per cent. more than we have had heretofore; and I am sure you will rejoice with your officers in this recognition of our needs.

At our last annual meeting it was decided to hold a summer meeting if it became possible to do so. This was accomplished through the hearty co-operation of the Erie County Horticultural Association, and on August 3d and 4th a very successful meeting

was held at North East, in the heart of the Lake Erie Grape Belt. The State-wide attendance was less than had been hoped, but the local attendance was excellent.

We were addressed by Mr. C. E. Bassett, Secretary of the Michigan State Association, and by Mr. H. W. Collingwood, Editor of the "Rural New Yorker," two gentlemen who find admirers and make friends wherever they go, and by our own Professor, R. L. Watts, one of the busiest men I know, and always busy to some good end.

Two sessions were given to addresses, and a whole day was spent in visiting the vineyards of the district in the automobiles of the growers,—a most delightful trip.

The vast extent of the grape industry here, the almost perfect care being given the vines, the careful business-like methods and open-handed hospitality of the growers, were truly revelations to most of us.

Financially, the meeting was self-supporting, more than sufficient being collected by the Erie County folks in the shape of membership fees, to cover all expenses of the meeting. Special credit is due, and is hereby given and expressed, to the local committee of arrangements, whose names I feel like repeating: L. G. Youngs, A. I. Loop, George W. Blaine, Willis E. Gray, George E. Pierce, Frank B. Crawford, D. C. Bostwick, Francis Newton Thorpe. They are such whole-souled, broad-minded gentlemen as it does one good to meet.

Your Executive Committee favors the plan of Summer Meetings out among the growers and recommends that another such meeting be held during the summer of 1910, provided a suitable place can be found and the necessary funds are forthcoming.

The present meeting has been arranged along somewhat more elaborate lines than has been our custom. Several additional sessions and the banquet are innovations which we trust will meet with your approval. We ask your indulgence in any shortcomings, and your heartiest support in carrying out the program.

The President.—The next number on the program calls for the report of the General Fruit Committee.

REPORT OF THE GENERAL FRUIT COMMITTEE.

JOHN D. HERR, *Chairman.*

From the standpoint of horticulture the State of Pennsylvania is divided like ancient Gaul, into three parts, based on distinct differences in both soil and climate, which is accounted for by the fact that the Allegheny Mountain system crosses the entire State in a diagonal direction from southwest to northeast. The boundaries of these sections for the purpose of this report have been based on these physical features as well as the isothermal lines.

Section one comprised all that territory north of the isothermal line 48 degrees of mean annual temperature, which conforms almost with the latitude 41 degrees 15 minutes north, except a dip

to the south in the western part of the State, so as to include Mercer, Butler and Lawrence Counties.

Section three consists of the southeastern part of the State and is bounded by an imaginary line starting at the north end of Bucks County and extending in a northwesterly direction to the junction of the east and west branches of the Susquehanna River; thence southwest, following the river to the mouth of the Juniata; thence, the range of the Blue Ridge to Mason and Dixon Line. This boundary coincides almost exactly with the isothermal of 51 degrees mean annual temperature.

Section two comprises the intermediate territory and consists largely of the region covered by the different ranges of the Allegheny Mountains.

This paper is based on the data supplied during the last few weeks by 75 correspondents representing 50 counties of the State, which reports show much thought and care and great interest, and my sincere thanks are herewith extended to all who have given assistance in this work. The promptness and comprehensiveness of these reports, together with the painstaking care used in making them out, speak well for the future of Horticulture in Pennsylvania. Upon the receipt of these reports I have carefully tabulated them and this paper contains a resumé of the data contained in them.

The yield of apples in Section 3 was above the medium, but far from a full crop. Sections 2 and 1, according to the reports have had a poor crop with very few exceptions. The Adams-Franklin County apple growing region report the largest yields for the year. The reports on quality and prices coincides about with the yield, having been good in Section 1 and lower in the remainder of the State. The answers to the question "Is this crop profitable?" have almost universally been in the affirmative, only 5 answers in the negative and the reasons given are poor soil, too many worms, wet weather, and lack of interest. Successful growers attribute their success to careful attention to the Cardinal Orchard operations, except one case where the report stated that his success was due to accident. Dry weather seems to have been adverse, militating against the fruit grower all over the State and was without doubt the most discouraging conditions with which he had to deal, as, aside from such measures of cultivation as he could resort to, it was absolutely beyond his control.

I made a special effort to find out the leading commercial apples in each county of the State, and purposely included the question intending to bring out this fact, and I find that in Section 3 the York Imperial comes first, having received 8 mentions out of a possible 18. Smith's Cider, Smoke House, and Baldwin stand 2d with three votes each. Stayman's Winesap has two; Fallawater and Grimes each have one. Other profitable varieties are Rome Beauty, Mammoth Black Twig, Rambo, Gravenstein, Ben Davis, Jonathan, Crauser, Dominee, Yellow Transparent, Kime, Strine-town Pippin, and Summer Rambo.

In Section 2 the leading apple is Baldwin, which received 21 votes out of a total of 30; Northern Spy comes second with 5 votes, the others being divided between York Imperial, Fallawater

and Strine-town Pippin, while other popular varieties of this section are the Rhode Island Greening, Wagner, Ben Davis, Gano, Jonathan, Winesap, Roxbury Russet, Smoke House, Yellow Transparent, Delaware Winter and Benoni.

The leading apple of Section 1 has proved to be the Baldwin also with the Northern Spy a close second. Other profitable varieties mentioned are the King, Rhode Island Greening, Maiden, Blush Ben Davis, Hubbardston's Nonesuch, Wealthy, Wagner, Smoke House, Smith's Cider, Tolman Sweet, Red Astrachan, Bismark and Bellfleur.

There are only a few localities in which the grower reports the packing of apples, it is enlightening to note the large number reporting, who sell their fruit in local markets. This is not surprising when one considers the enormous demand for fruit within the borders of this State of 7,000,000 population, many of them included in the manufacturing towns of the State. No other State in the Union affords a better home market for all kinds of fruit.

The prices of apples in the commercial district range, as a rule, from $2.00 to $2.75 per barrel, the highest price mentioned is $5.00 per barrel for fancy grades.

The yield of pears is reported poor all over the State, with good and medium varieties selling at good and fair prices, which range from 75 cents to $2.00 per bushel. The only correspondents reporting the increased commercial pear planting comes from Section No. 2, and these report for the counties of Bedford, Blair, Clarion, Armstrong and Cambria.

The most destructive pests of pears are the San Jose Scale, and Pear Blight, the universal infection of which is indicated by the fact that all reports except 10 gave Blight as an answer to this question. Two reports gave caterpillars, one canker-worm, and one curculio, one codling moth, and one carelessness on the part of the grower.

One good feature of this report is the fact that peach growers give almost universal expression to the good peach yields, good quality and good prices of this fruit in the entire State, except 6 growers from the northern section who report the yield as being poor and attribute the fact to late frosts. The prices of peaches range from $1.00 to $4.50 a bushel. The conditions are favorable to the growth of peaches in sections 3 and 2 except for the dry weather of the last few seasons. The cold winters of the northern tier of counties of the State, make the growing of this fruit rather hazardous. One man reporting his crop is destroyed by frosts three years out of four.

The most destructive pests of the peach are the San Jose Scale, borers and yellows. Brown rot is also reported as well as curculio. It was the chairman's intention to call out all possible preventives of borers and the question inserted in the list, "What successful preventives have been found valuable for this insect?" Unfortunately, it seems this question was somewhat misunderstood and instead of preventives, the usual answer was the most common cure, consisting of cutting them out with a knife. A few, however, have answered according to the meaning of the question and painting

apple trees with white lead and raw linseed oil, wrapping trees with tar paper, spraying with lime-sulphur mixture, wrapping with wooden veneer, clean culture, mounding and eternal vigilance were mentioned as preventives.

In addition to this I wish to add my own experience with this pest. In the Spring of 1908, I planted, among other trees, 2,000 apple and peach trees, having left 100 trees for which I had no room, and which were heeled in beside the orchard. During the latter part of the month of June I applied to the trunks of those planted Good's Caustic Potash Whale Oil Soap, two pounds to one gallon of water, but did not apply any to the healed in trees. In the Spring of 1909 I took up the heeled in trees and found that 80 per cent. were infested with borers while on the treated 2,000 trees only one borer was found after a careful search. I would add this treatment therefore to the list given in these reports.

One large fruit grower submits as the most destructive pests that of careless workmen and mules. This statement many of us will heartily endorse because they are not only destructive, but exceedingly hard to control as no spray ever concocted will be in any way effective in checking their miserable ravages.

In answer to the question, "Is brown rot controlled?" the concensus of opinion is in the negative. The most common spray used to prevent rot is Bordeaux mixture, a few prefer to use the self-boiled lime-sulphur solution with indifferent results. This spray seems decidedly to be still in the experimental stage. In answer to the question, is peach culture profitable, we have only a have-dozen "nos" which come from the northern part of the State, and even they admit it to be profitable in favorable locations. This matter of site is exceedingly important in the northern section.

The yield of plums was as a rule from medium to very good, with quality fair to good and prices universally good, ranging from $1.00 to $3.00 per bushel. Conditions were usually favorable. Most destructive pests are San Jose Scale, Rot, Curculio, Black Knot, and Yellows. The most profitable varieties of plum seem to be the 1st Green Gage, 2d German Prune, 3d Lombard, 4th Burbank, 5th Abundance and Moore's Arctic. Two other profitable plums are 6th the York State Prune, and 7th the Damson. One grower reports that he grows most the Domestica and that they stand full strength of Bordeaux Mixture without injury to the foliage or fruit. Few plums are shipped outside of the State and the packages in which they are marketed range from the quart box to a half-bushel basket or crate.

The unanimity on the subject of cherry-growing is startling. Practically every correspondent answers by saying that cherry-growing is not largely engaged in, but that it is profitable. The small number of trees being planted may be the cause of its being profitable, but a few of us at least are planting cherry in the hope that the demand will consume more cherries than are already grown, especially in the neighborhood of the larger markets. As to the best varieties, Montmorency is in the lead, with Early Richmond a close second. Other varieties favorably mentioned, are Governor

Wood, Black Tartarian, Napoleon Biggareau, Morello, May Duke, Ida, Windsor, Reine Hortense.

Excepting in a very few cases the reports state that grape-growing is carried on only for the local market. The success attending the growing of grapes is very good, good and fair. Few localities report none grown and these only in the northern tier of counties. According to the reports there are practically only six varieties of grapes grown in this State which can be considered best varieties, namely: Concord, Niagara, Worden, Moore's Early, Brighton and Isabella.

The most profitable varieties of strawberries seem to be the Sharpless, Haverland, Gandy, Bubach, Wm. Belt, Glen Mary, and Senator Dunlap, in the order mentioned.

In the line of the most profitable varieties of raspberries the Cumberland is an easy winner. Other varieties frequently mentioned are the Cuthbert, Gregg, Kansas and Lawton.

The Kitatinny, Ward's Eldorado, Taylor and Snyder are among the best varieties of blackberries.

Other small fruits mentioned as profitable are: Currants and Gooseberries. The season for vegetables was exceedingly unfavorable to success on account of the general drought all over the State. The crops paying best in the order of their importance are: Potatoes, cabbage, tomatoes, sweet corn, cucumber, beets and celery. The most destructive pests are: Potato Bug, Potato Blight, Green Aphis, Flea Beetle, Cabbage Worm, Anthranose, Root Maggots and Celery Rust.

Market gardening is profitable according to the answers to the questions everywhere, except in five counties, in which the market is poor. I might add an extract from a letter of one of the leading market gardeners of the State, who writes: "There is probably no section where rust, blight, fungus, insects or other diseases are as injurious as in this valley. We have borers, yellows, scale, anthranose, rot, aphids, leaf blight and other pests to contend with as well as frosts and poor soil; also two successive dry seasons, so that the prospects are not very encouraging."

On the subject of pests and sprays, I have gone into considerable details and in answer to the question, is San Jose Scale held in check? all answer "yes" except 14. Under remedies, I have received 50 answers in favor of lime-sulphur solution and 13 for all other sprays including oils.

In quite a few localities in Section 1 no scales are reported and no spraying is done for this pest. Under the title, "What sprays are not satisfactory?" seven mention the oils. Five of which specify Scalecide, one Target Brand, one crude oil, and in addition to these a few report damage from the use of Bordeaux Mixture. I have requested these correspondents to specify distinctly in what this injury consists, and for the Bordeaux Mixture the answer is "defoliate the trees," and "russet the fruit," while for the oil injuries the report is, "roughens the bark," "enlarges the lenticils," "kills the bark" and "kills the trees."

A report from one of the leading and most successful fruit-growers in the State is that Scalecide gives best results in his

orchard. Another that he has used this spray in his apple orchard for 5 years without damage to the trees. While a third equally large grower states he would allow no oils to be used on his trees.

Spraying for Codling Both is largely on the increase and over 50 answered "yes" to this question. Arsenate of lead is the poison most used. Paris Green, London Purple, Arsenite of Lime and Pyrox are frequently mentioned as being used. A few mention Bordeaux sprays for the Codling Moth in spite of the fact that volumes have been written on the subject of spraying with fungicides for fungus diseases and stomach poisons for chewing insects. The results of Codling Moth sprays is universally good without a dissenting voice. The spray used for fungus diseases is Bordeaux Mixture, Pyrox and self-boiled Lime Sulphur, although, as brought out by a special question, this material is very little used.

The following results in answer to the question on the presence of Pear Blight shows that this disease is spreading with frightful rapidity all over the State. The same can be said of Collar Rot or Blight, which is the same disease located on a different part of the tree, but more destructive because it attacks the trunk and thus more readily destroys the entire tree. In reply to the question as to what remedies have been applied for Collar Rot, the only remedy is that of cutting out the disease, to which I would respectfully add that the wounds should be painted with some solution, followed by a coat of paint, to prevent the destruction of the wood, and also that the remedy published by certain western experiment stations, namely, a mixture of sulphur and lime using one part of sulphur to three parts of lime be applied to the base of the trunks after the diseased parts have been removed.

Injury by mice and rabbits seems to be very common all over the State, and the remedies offered are the use of wooden veneer and screens about the trees, wrapping with tar paper, cleaning up rubbish, tramping the snow about the trees in winter, spreading the prunings through the orchard and catching the mice and shooting the rabbits.

There seems to be a general awakening in the minds of the fruit grower as to the possibilities of the application of fertilizer in the orchard; 37, or one-half the entire number of correspondents answered by stating that commercial fertilizers are being used in the orchards of their respective districts, while those from the southeastern section of the State, where fruit growing is more intensive, report unanimously in the affirmative and most of the negative answers come from the northwestern half of the State, where, as one grower put it, "fruit growing is left to the beneficent care of a kind Providence." He says further, "I am by no means proud of our fruit growers, as they are not as a rule very progressive."

The composition of fertilizers applied to orchards, consist as a rule, of fertilizers high in potash and phosphoric acid, although many advocate the use of complete fertilizers on the formula of 2, 8, and 10. The results of applying this fertilizer are reported to be excellent, and stable manure is being used by 50 correspondents with good results, except on fertile soil and in peach orchards. Where there has been trouble with blight on apple, pear and quince

trees we should remember the well-known fact that too much nitrogenous fertilizer as well as cultivation disposes the tree to this disease, and where there are any signs of this trouble too much of the nitrogenous fertilizer should not be applied and cultivation should be changed to some system of mulching.

Cultivation of orchards is largely on the increase, especially in the southeastern half of the State. The usual system being plowing in the early spring, cultivating to July and then sowing a crop of peas, clover or some other cover crop. Growing of crops in the orchards is quite common, especially in young orchards. Some correspondents state that it is their earnest conviction that no peach orchard can be long maintained without cultivation. Which statement we heartily endorse. Mulching is practiced in quite a few orchards of the State with very good results.

On the subject of pruning trees, 55 agree that heavy pruning of peach is necessary and a few write that light pruning is all that is ever demanded, and a few take the stand that no pruning is necessary. The majority of the growers admit that thinning fruit is profitable, while many say it is not, giving as a reason that the work is too laborous on high trees to be economical. Nearly every correspondent states that to keep honey bees in an orchard is good. A few answer "no." While others declare their antipathy to these busy little insects and for personal reasons refuse to keep them. A few maintain that they are not necessary for the growing of any kind of fruit.

In answer to the question, "Is commercial planting on the increase?" 43 answer in the affirmative. This comprises the greater part of the State, and is in line with information I have received from other sources showing that in the State of Pennsylvania during the last two years an enormous amount of commercial planting has been going on. This is no doubt due to the fair prices received for fruits, as already reported and also that the fruit grower is assured of the fact that he can cope successfully with the insect pests and fungus diseases which were up, to recently, the bugbear of the fruit grower.

In the words of one correspondent who writes upon this subject: "Commercial fruit growing is on the increase. The results obtained by a few specialists has encouraged others to follow the example, but their financial account will only be measured by the care, attention and intelligence which they can exert towards making fruit growing a success. Those who are the most successful, work understandingly and leave nothing undone to deserve success. Where the old, haphazard routine is followed, disappointment and consequent loss of money and time is almost inevitable. The opportunities and possibilities are promising, and there is no doubt but what there will be many growers entering the arena who will merit and gain success.

"The work done by the State authorities in combating the pernicious San Jose Scale is invaluable. The total extermination of many large apple orchards was only prevented by their timely action and advice. The damage already done in eastern Pennsylvania is alarming, and even under most favorable conditions, many

years will be required to restore the valuable trees that were killed by the scale. What would happen without determined and concerted action is not difficult to contemplate.

New varieties recommended for Section 1 are Mammath Black Twig, Clearfield Pippin, Winter Banana, Stark and Pewaukee: for Section 2, Stayman Winesap, Rome Beauty and Gravenstein: for Section 3, Sutton Beauty, Banana, Stayman Winesap and Bonum.

In connection with the subject of new varieties I might mention an interesting report from the central part of the State describing an apple tree over 100 years old which is in the habit of bearing both sweet and sour apples simultaneously, and, wonderful to relate, apples sweet on one side and sour on the other. My informant fails to state which side is sweet and which is sour, but does make it plain that one cannot distinguish these from the others until one eats them. Probably this is the reason he failed to send me specimens for exhibition at this meeting for which I offered to pay him well.

Some light may be thrown upon the awakening of the citizens of this State to the necessities and possibilities of fruit growing within our borders by stating here that when it became known last November that the Division of Zoology proposed to enlarge its work by demonstrating methods and supervising orchards on a limited number of premises, within 6 weeks there were over 1,300 orchard owners who applied for this service. This at least shows that these people, many of them owners of thousands of trees, had reached a point in their experience in the work where they were open to instruction. Some of the pleas made for help were so pathetic as to almost provoke tears.

Your chairman begs to submit herewith what are considered as the most urgent needs of the fruit growing interests of the State as follows:

The enlargement of the scope of the work of the State Department of Agriculture in order that the assistance called for by the citizens of the State can be supplied either through the Division of Zoology or otherwise, so that fruit growing in Pennsylvania will be put on the high plane its importance and the natural advantages offered here deserve.

Co-operative buying of supplies by this association, thereby insuring a better grade of materials as well as a saving of from 20 to 40 per cent. on all purchases and incidentally largely increasing the membership of the society.

A law standardizing spraying chemicals, thus insuring the orchardist against failure on account of adulteration.

A survey of the fruit soils of the State for the use of prospective planters in selecting profitable varieties.

Respectfully submitted,

The President.—This report is now before the house; have you any questions, or any criticisms to make on it?

Prof. Surface.—I would like to ask at what time to apply the whale oil soap to prevent the borer. I have an idea that the time of application is very important.

Mr. Herr.—The last week in June.

Prof. Surface.—That is all right.

A Member.—Will one application be sufficient?

Mr. Herr.—It was with us. It sticks fast, and I believe kills thousands of the worms as well as of the larvæ.

A Member.—My experience has been that we have a great many new borers late in the season—fresh lots of them.

Mr. Herr.—Of course, there are lots of them that remain until the fall of the year, but they hatch in July, and that is the time to look for them.

Mr. Fenstermaker.—I would like to inquire whether he means the peach or the apple tree, and the strength of the application?

Mr. Herr.—Both; and the strength of it is two pounds of whale oil soap to the gallon of water. It can be applied with a paint or whitewash brush.

Prof. Surface.—I would suggest that if the season is rainy, it would be well to apply it not later than the beginning of July, as that is about the time when the borer begins to lay eggs. The last season was very dry, which was, perhaps the reason why one application was sufficient.

The President.—If I hear no objections, the report will be received and published in our proceedings. As I hear none, it is so ordered.

We will now take up an address by H. F. Hershey, of East Petersburg, on "Some Western Apple Methods." Mr. Hershey is a Senior at Pennsylvania State College.

SOME WESTERN APPLE METHODS.

H. F. Hershey.

Much has been and is still being written of the methods of the western apple growers and the fine apples they produce. Many sections, as the Hood River Valley, Oregon, the White Salmon District, the Wenatchee and the Yakima Valleys, Washington, and numerous other sections are known from the Pacific to the Atlantic coast and even farther than this. The people of Great Britain, Germany, France and other European countries eat their apples

and pay a high price for the privilege of doing so. Why is this true? It is because the people of the west are alive and looking for every opportunity to advertise and make their apples better known throughout the world.

In treating my subject I shall confine myself to the Hood River Valley, Oregon, as I am better acquainted with that valley than any other western district, and the methods vary but little at other places. It might be well to explain the reason of my visit to this district. The Department of Horticulture of the School of Agriculture of the Pennsylvania State College requires in its course that some time after the Junior year be spent in some large commercial orchard or some well-known fruit district, for the purpose of making a study of methods used, market conditions, etc. It is entirely optional with the student as to where he wishes to do the work, but suggestions are given. One of my classmates and myself took Hood River Valley, Oregon, as the place to do this work. We were furnished blanks by the Department as an outline. I will read the outline as it was given to us and as such it will serve in the discussion of my subject. (See Page 27.)

Hood River Valley is situated in the midst of the Cascade Mountains, along the Columbia River, and 65 miles east of Portland. The valley, as it is called, is seemingly a plateau and is drained by the Hood River which has its source in the glaciers of Mt. Hood. Mt. Hood stands in the southern end of the valley and Mt. Adams is just across the Columbia River in Washington. These two snow-capped mountains give the valley a cool climate in summer. The valley has three natural divisions—the West side, which lies between Hood River and west to the mountains; the East side, or the portion lying east of the river, and extending southward to about ten miles from the Columbia, and south of this extending for ten or twelve miles is the Upper Valley. This is a narrower and much higher valley and merges into the foothills of Mt. Hood. Only a small portion of it is cleared and set to fruit trees. The first two divisions named are where most of the fruit is grown. The valley is about 25 miles long and from 5 to 10 miles wide. It is indeed a very small place to have such a great reputation. Hood River is the principal town and there are several smaller towns scattered throughout the valley.

Methods of planting or setting out are practically the same as those used here in the east. The square, hexagonal, and quincunx methods are chiefly used. Planting distances as a rule are much closer than in the east for several reasons: (1) the trees do not live as long and (2) they do not attain such a large size. They are planted 25 feet apart and sometimes even closer.

The soils are mostly derived from volcanic ashe and as a general rule are very light in texture. Six soil types are found in the valley and the one occurring to the greatest extent is known as volcanic ash. Nearly all of the orchards are planted on this soil type. The soils being light and as rainfall is not very plentiful, irrigation is practiced to some extent. Strawberries are grown quite extensively in the orchards on the east side of the river, and here irrigation is necessary. When the orchards are not intercropped,

FRUIT ..... No. .....

.....County **ORCHARD SURVEY** Date.....

The Pennsylvania State College

Owner ..... P. O. .....
Location ..... When planted .....
Site ..... Aspect .....
Soil, type ..... Variations .....
Drainage, Natural or Artificial ..... Character .....
Soil management (now and for past 10 years) .....
....
If sod, method of treatment .....
If tilled, frequency .....
....
Fertilizers, kind ..... Quantity ..... Frequency .....
Cover crops ....
Pruning method ..... Frequency ..... Character .....
Spraying, mixtures ..... Effects .....
No. Applications ..... Machinery .....
Troubles, Fungi ....
Insects ..... Others .....
Present Condition .....
Varieties .....
Variety Notes ....

	19.....	19.....	19.....	19.....	19.....
Yields.....	.....	.....	.....	.....	.....
Price.....	.....	.....	.....	.....	.... ACRES
Income per acre..	$.....	$.....	$.....	$.....	$.....

Where and how sold .....

Package used ..... Labor .....

General observations .....

..... Observer .....

Planting Plan.

irrigation is seldom practiced. Many of the growers think that if the orchard is once irrigated, this method must be followed as the trees have become accustomed to plenty of water, and so demand it all the time. In other words the trees can be trained. As good results are obtained from non-irrigated orchards as from those that are irrigated. The water used in irrigation is brought all the way from Mt. Hood in canals along the sides of the mountain and is then distributed through the valley by means of laterals. The rill method is used chiefly in the orchards.

No sod mulch is used at any place in the valley. The dust mulch is counted upon to keep up the water content and a good mulch is always maintained. The orchard is gone over about every ten days with a spike tooth harrow and in every orchard into which I walked I could kick the loose earth away to the depth of several inches and underneath that I would always find a good moist soil. The average rainfall is not over twenty inches and most of this comes in the form of snow during the winter. It very rarely rains during the summer and yet they give their trees all the water they need by maintaining a good soil mulch. Many of our eastern growers might have better success if they gave this point more attention.

Cover crops are used to some extent but not as a general rule. When they are used they are sown about the middle of August and then disced in during the early spring. Crimson clover is used most largely but vetch and rye are also used to some extent. A number of the growers think that the time is not far distant when every one will be using cover crops.

Hood River Valley is comparatively a new country and there are not many orchards older than fifteen years. The orchards were all set out in the virgin soil and as the soil is of light texture, the older orchards are beginning to lack some of the essential elements of plant food. So in these orchards commercial fertilizers are used to a limited extent but their use is not general. The leading growers are of the opinion that in a few years fertilizers will be applied more generally and with results that will make their use more acceptable.

Both winter and summer pruning are practiced and there are some few of the growers who rely on summer pruning alone but they are the exception rather than the rule. A larger number prune both in winter and summer but by far the greater percentage prune in winter only. The open center tree is preferred and in nearly every instance the trees are headed low, 18 to 20 inches from the ground. In winter pruning the tree is shaped while in summer the water sprouts and cross limbs are cut out. As a general rule pruning is well done and careful attention is given to it, but every one has his own ideas as to the way it should be done, and so the same methods are not in vogue throughout the valley.

The fruit grower in Hood River is troubled very little with fungous diseases. One of the chief reasons for this is their effective methods of spraying. It has been said that there is a cloud of spray continually floating over Hood River Valley. This statement is somewhat exaggerated but the fact still remains that they do a great deal of spraying. Some of the fungus diseases found

are anthracnose, milldew and apple scab. The rots are not troublesome. Bordeaux mixture is the fungicide most commonly used and good results are obtained from it.

The codling moth and aphis are among the most troublesome insect pests at present. The San Jose scale at one time threatened to ruin the orchard business, but thorough spraying did the work and now it is hard to find any scale in the valley. Even though the scale has been practically exterminated, nearly every grower gives his orchard a precautionary spraying of lime and sulphur in the spring. The green and brown aphis are very plentiful and require effective methods of spraying to keep them in check. The brown aphis is hard to combat because of the fact that the leaves on which they feed are badly curled as a result of the wounds inflicted by them and they cannot be reached easily. The brown aphis make their appearance early and make a very vigorous attack upon young twigs in the central or shaded portion of the tree. The growth of many twigs is entirely stopped and others are weakened and caused to grow crooked. Their work lasts for only a short time as they disappear on the approach of warm weather. The green aphis is much more plentiful and more persistent but is more easily controlled by insecticides although several sprayings are often necessary. An extract of quassia chips and whale oil soap is in general favor as a remedy, and by far the greater number of growers use it, generally applying it several times. Kerosene emulsion and formaldehyde soap are also used.

The codling moth always was and always will be a serious pest and it is only kept down by a very close attention to spraying. Lead arsenate is the insecticide used and it is used with the best results. The home-made preparations have been abandoned for the commercial brands. A large number make the first spraying just as soon as the petals have fallen and others spray just as soon as the weather conditions are favorable. All agree that four, five and six sprayings are necessary for the best results and few give a less number than four. The general idea is to keep the apple well covered with the arsenate and as this is a district of little rain it is not very hard to do. The first sprayings are generally made at intervals of ten days and the last few at intervals of about fifteen days. Those who have power pumps always try to fill the calyx cup at the first spraying as they think that it is more effective.

The orchards as a rule are small and the average size for the valley is about sixteen acres. I do not think that there is one orchard over seventy acres in area. In the small orchards the hand pump sprayer is used while in orchards twenty-five to thirty acres in area the power sprayer is the general rule.

The leading apples grown in the district are the Yellow Newtown and the Spitzenberg. Ten or twelve years ago a great many varieties were planted in a single orchard. This was found to be unprofitable and a large number of the varieties were topworked with the Yellow Newtown and Spitzenberg. The later plantings have nearly all been of the varieties named. The reason for these two varieties being so popular is that they are good bearers, good shippers, good keepers, and high in quality. Then, too, they take

on a high color and put up a good appearance. The Ben Davis, Arkansas Black, and Jonathan are also grown to a limited extent.

The general opinion in the valley is that the Newtowns and Spitzenbergs need to be pollenized for the best results by some other variety. The Ortley and Arkansas Black are considered to be good pollenizers and are found scattered through many of the orchards. It has been demonstrated by actual experiment that these apples need to be pollenized but it seems to be the concensus of opinion that they must.

One thing that seems very peculiar in spite of the reported high yields and large profits made is that many of the owners have only bought their land recently and paid a high price for it. Many of the people are willing to sell but the price ranges from $1,000 to $2,000 per acre. This buying and selling seems to be characteristic of the west and should not be taken as a sign that these lands are not giving a good return for the money invested. On account of this fact it was rather hard to get yields from the growers. The yields vary from 150 boxes to 500 boxes per acre of first class apples. The price per box for the last few years has ranged from $2.00 to $3.15 per box and some of the apples have sold for even higher prices than this. The income per acre ranges from $300 to $2,000, the last named being very high and the average being about $500.

All of the apples are marketed in New York and London by the Hood River Fruit Growers Association. Every apple of the valley is handled by professional packers, who pack the product of all the orchards to a uniform grade, in one bushel boxes, and none of the growers are permitted to pack their own fruit. The grower's name, variety, and the number of apples in the box are found on the outside on a fancy label. The box is always lined with fancy paper. The Hood River Fruit Growers Association is to be commended for the thorough manner in which they do their work. Every box is inspected and such is their reputation that apples are ordered by telegraph in car load lots at the highest prices without the buyers ever seeing the fruit. The apples are sorted and packed according to size, exactly the same number of apples going into each box. These sizes run from 54 to 128 in a box, the designation being 3½, 4, 4½, and 5 tier fruit. This is certainly an enviable reputation to have and it clearly shows the value of a brand or label with an honest man or men behind it.

It is very interesting to note the class of people who have made Hood River Valley their home. Here is a professor who had taught in one of the eastern colleges. Here is a Yale and there a Princeton graduate. I will give an example of a Yale graduate and a graduate of the Boston Institute of Technology. These two young men were partners and evidently had plenty of money. They had come to the valley about three years ago and purchased about thirty acres of orchard land at $1,000 per acre. They were living in princely style, said they were making money, enjoyed the life immensely and had been offered $1,500 per acre only a few days prior to our visit and would not consider it. It was no uncommon occurrence to find a grower away from home on a pleasure trip either

to New York or California, or some other place. The people as a whole are very sociable and readily give any information asked. My opinion of the valley is that it is a place for the capitalist and not a place for the poor man who has to make a start.

It would seem that the eastern grower would not have a chance to compete with the western apples. The eastern apples have one thing which is becoming of more importance every year, namely quality and many of the western apples do not have good quality. A striking example of this point was made at the meeting of the Pennsylvania State Grange held at State College, December 21 to 24. Rogue River, Oregon, Spitzenbergs and Newtowns were pitted against Pennsylvania Baldwins, Grimes Golden and Stayman Winesaps. The Baldwins were grown in Perry County by our honorable President, Mr. Heister, and the Grimes Golden and Stayman in Adams County. The Pennsylvania apples won out on their merits both as to quality and color. A committee of three competent apple growers gave their decision in favor of our apples and the audience voted the same way. Considering everything and when the Pennsylvania apple growers as a whole, as is being done in some sections, apply the methods of the west there is a bright day ahead for the apple grower of Pennsylvania.

The President.—Are there any questions you would like to ask the writer of this excellent paper? He will be ready to answer any questions.

Prof. Surface.—I notice he says they have exterminated the San Jose Scale. I would like to ask what material they used.

Mr. Hershey.—Lime and sulphur.

Prof. Surface.—Commercial or home-boiled?

Mr. Hershey.—Commercial mostly.

The President.—I want to add to what has been said that we have among our exhibits four boxes of apples that were sent here from Montana. We have placed them alongside of some Wyoming County apples, and I want you to form your own opinion as to which is the finest fruit.

Mr. Case.—I notice that the gentleman says they sprayed several times with arsenate of lead for coddling moth. We have always understood that the only time we could catch it was before the calyx closed. The Chairman of the Oregon Board of Horticulture called on me last summer while on a trip east, and we talked over the matter with our State Entomologist at Ithaca, who died last summer. He told us that the coddling moth lays its eggs anywhere on the apple, but when the larvæ are hatched they look for some place to crawl, and about 90 per cent. get into the calyx, and the other 10 per cent. get in between the leaf and the apple. This gentleman said that on the way to their hiding place, the coddling moth larvæ

would take tiny bites out of the apple. Now, the question is, does it eat before it hides, or does it hide before it eats? Can any entomologists here oblige us by telling us?

The President.—That is something like the Irishman's question about the mule: does he bray because he kicks, or does he kick because he brays? We have our Entomologist, Prof. Surface, with us. Can he answer that question?

Prof. Surface.—The moth begins on the outside of the apple, and eats his way into it. The first brood generally gets into the calyx, and the second brood usually gets in between two apples, or between the apple and the leaf.

I would like to ask Mr. Hershey if he was not mistaken about their doing more than one spraying for the coddling moth? We have been led to think by the journals, that one spraying was sufficient, and I have understood that the practice in the western states was only one spraying for the coddling moth.

Mr. Hershey.—I understood that they followed that practice in some parts of the west, but not in the Hood River district. I was there twice, once in July and once in August, and found them spraying. Their idea was to keep the apple covered with arsenic.

Prof. Surface.—They did not make a special spraying for the second brood?

Mr. Hershey.—No, sir.

A Member.—I was out in Spokane, and I spoke with a fruit-grower there in regard to this second spraying. He appeared to think that sticking to it was necessary, and said they were going back to spraying the second time in his district.

Mr. Catchpole.—I would like to ask the growers here what has been their experience with the 3-4-50 formula for Bordeaux. We tried it, and the damage done by russeting the fruit was great.

A Member.—I would like to ask whether cutting the bluestone down to two pounds would be as beneficial in killing the fungous without being as injurious to the fruit.

Mr. Case.—I find that in Michigan they used two pounds of copper sulphate and three or four pounds of arsenate of lead, and they spray three, four or five times. They always look for a second brood, and when they do not spray for it they always fail; but climatic conditions may have something to do with this.

Mr. Walton.—I would like to ask Mr. Hershey what is the possible number of sprayings given by the Hood River growers during the season?

Mr. Hershey.—I don't know that I am able to answer that, but they have a preliminary spraying for nearly everything. Where they have no San Jose Scale, they give a preventative spraying for it, as well as for every other known fungus growth and insect. The spraying with the arsenate goes on practically the entire season, so that the whole season is practically taken up by spraying. Several times in the summer they spray for the asphis.

The President.—What do they spray with for aphis?

Mr. Hershey.—Whale oil soap.

Prof. Watts.—It seems to me that one of the main facts brought out in Mr. Hershey's paper is that the western men are so much more thorough than the eastern men. We read so much about the great possibilities and fine fruits of the west that people are beginning to think Pennsylvania is not in it, in growing the apple. I have had considerable correspondence this year with men of wealth and capital who are interested in growing fruit and seem to imagine that they must go west to grow good fruit, but I think if they realize what they must do in the west, and are willing to apply the same methods here, they can do even better at home, for here we have the soil, the climate, and the market close at hand.

The Secretary.—I would like to know if Mr. Hershey has heard any estimate of the cost of a box of apples f. o. b. cars?

Mr. Hershey.—No, I did not. I asked one of the growers if he could give me an estimate delivered to Chicago, and he said he could not.

The President.—This paper has brought out a very interesting discussion, and I think it has impressed us all with the fact of how much more thorough these men are than we are. It has certainly opened the eyes of some of our "Pennsylvania Dutch" fruit growers (myself among them), to the number of sprayings that they give. It is away beyond my limit.

We shall proceed now with the appointment of committees. We want you to name five members for the Committee on Nominations.

On motion of several memers, the following gentlemen were named: R. J. Walton, F. H. Fassett, D. W. Hull, Prof. R. L. Watts, and Cyrus T. Fox.

The President.—I appoint these gentlemen to be the Nominating Committee. We shall be glad to receive their report to-morrow morning. Now, while it is understood that these gentlemen will place in nomination members for the several offices, it is by no means necessary that you vote for those they select. You can vote for any one you please.

I will now appoint as a committee to judge the fruit, the following gentlemen: E. W. Catchpole, Prof. W. J. Wright and Horace Roberts. They are all men who know good fruit when they see it, and none of them are interested in anything on display. I have also appointed the two gentlemen from adjoining states for an-

other reason: we want them to examine Pennsylvania fruit and see what we can do.

As a committee to audit the Treasurer's account, I will appoint the following gentlemen: P. S. Fenstermaker, C. A. Griest, and D. W. Hull.

As a Committee on Resolutions: Prof. R. L. Watts, T. C. Foster and R. J. Walton.

We will now have the Treasurer's report.

The Treasurer here made his report, as follows:

TREASURER'S REPORT, STATE HORTICULTURAL ASSOCIATION OF PENNSYLVANIA.

Receipts.

Cash balance January 19, 1909,	$73 83	
Annual dues for 1909, collected at Harrisburg,	92 00	
Peter R. Boltz, life-membership,	10 00	
Donation,	300 00	
H. H. Snavely, life-membership,	10 00	
Additional dues received during the year,	75 00	
Annual dues for 1910 in advance,	4 00	
Chester J. Tyson, Sec., balance from Summer Meeting,	65 57	
Total,		$630 40

Disbursements.

To Steelton Store Co. Limited,	$7 50	
To J. Henry Spicer, Supt., use of tables,	3 00	
To Prof. S. B. Heiges, railroad fares, etc.,	20 45	
To Harrisburg Board of Trade,	21 00	
To The Lochiel, hotel bills,	33 75	
To Enos B. Engle, Sec., salary and sundries,	78 92	
To L. G. Youngs, travelling expenses,	20 54	
To Prof. John P. Stewart, travelling expenses,	6 08	
To Edwin C. Tyson, expenses to Washington,	14 82	
To R. M. Eldon, expenses to Washington,	14 82	
To Mrs. D. M. Stewart, stenographic report,	50 92	
To J. H. Hale,	77 00	
To Chester J. Tyson, General Fruit Committee,	43 00	
To J. Horace McFarland Co.,	3 00	
To Pub. House of the United Evangelical Church,	117 42	
To Pub. House of the United Evangelical Church,	14 65	
To Chester J. Tyson, Sec., sundries,	29 02	
To Balance, cash on hand,	74 51	
Total,		$630 40

The President.—What shall be done with this report?

The Secretary.—I move it be referred to the auditing committee.

This motion was properly seconded and regularly carried.

The President.—If there is no further business, the meeting stands adjourned until this evening at seven o'clock, when we will meet in Grange Hall to enjoy the banquet tendered us by the ladies of the Tunkhannock Grange.

Adjourned.

TUESDAY EVENING, JANUARY 11, 7 P. M.

Banquet.

About one hundred members and guests of the Association gathered in the Tunkhannock Grange Hall at the appointed hour.

The supper, provided by the ladies of the Grange, was plain and good and very nicely served. Much credit is due these ladies and the officers of the Grange.

As toast-master, Mr. W. F. McSparran conducted the further ceremonies of the evening in a pleasing and satisfactory manner. A long list of members, guests and officers were called upon and responded to informal toasts.

The avowed purpose of the banquet was to "break the ice," and to make everyone feel acquainted and at home in the convention. We believe this result was accomplished.

WEDNESDAY, JANUARY 12, 9 A. M.

President Hiester in the Chair.

The President.—The first number on the program this morning is a talk on "Grape Culture," by a very successful vineyardist of North East, Pa. I take great pleasure in introducing to you Dr. Francis Newton Thorpe of Mt. Holly, New Jersey, and North East. Pa.

GRAPE CULTURE.

By Francis Newton Thorpe, Ph.D., LL.D.

Mr. President, Ladies and Gentlemen: Some of you may think it a little far-fetched to present for discussion to the State Horticultural Association, the subject of Viticulture—the growing of grapes for commercial purposes.

I am reminded of what a friend of mine said he had learned from the prayer book, regarding marriage. He says that accord-

ing to the prayer book a man can have sixteen wives, and be married in sixteen ways—four better, four worse, four richer and four poorer. Now, the subject of Viticulture is something like that.

Some twenty-two or twenty-three years ago I became interested in the production of the grape. The work has gone on steadily and interruptedly. My experience has been among those who paid high for the truth, and enjoyed a very respectable proportion of the returns. We have received a net profit of a hundred to a hundred and twenty-five dollars per acre, and we have on the other hand

"CONCORDS."

From a photograph of a small corner of "Indian Arrow Vineyards," the property of Francis Newton Thorpe, at North East, Erie Co., Pa. Vines set in 1894 and photographed on October 1, 1906. Note the beautifully uniform vines, heavily loaded with fruit.

experienced the delights of postponing the payment of bills. Nevertheless, the culture of the grape for commercial purposes is a practical problem, which is determined to a large degree by natural conditions. If you want to raise grapes you must not farm upon the imagination; you must stick closely to facts, and put yourself in harmony with the laws of nature.

The cultivation of the grape in Erie County has been followed for the past fifty-two years. It so happens that a part of my own vineyard was among the first that were put out. The two great principles in viticulture are, first, climate, and secondly, care. In

this part of the State (Wyoming County), where you have such a wonderful opportunity for the production of the apple, perhaps you will not be greatly interested in the details of the production of the grape in Erie County. Most people, when they have a few vines, think they have a vineyard. In Erie County there is an acreage of about seven thousand acres devoted to the grape alone, some parts of which are in a very high state of cultivation. On the other hand we have among us men who think that all that is necessary is to put in the hand and take out the fruit. Any soil that is adapted to the production of the grape is very soon exhausted. We must understand that we are the prisoners of climate and servants of the soil.

To grow grapes successfully, we must have a climate that does not drop in temperature below 25 degrees, nor rise above a hundred degrees. Of course, that is a very wide range for the cultivation of any fruit. In the Italian vineyards, the temperature is regulated by the Pyrenees, and the Alps, mountain protectors to which is largely due the success of the vine in Italy. On the Pacific Coast of our country the mountains have a great deal to do with the production of a fine grade of fruit.

Another important factor in the successful production of the grape is the saturation of the atmosphere. Poor vineyards are sometimes due to trying to raise grapes in a climate that will germinate fungus. In the cranberry bogs of New Jersey, as well as in the vineyards of North East, the point of saturation of the air has much to do with results. It is doubtful whether grapes can be raised successfully in New Jersey, owing to the humidity of the atmosphere. Whether one can raise enough grapes to pay for his trouble and leave a little margin of profit, depends very largely upon climatic conditions. The happy man in viticulture is he who lives in a belt where the most favorable conditions are likely to surround him.

The vineyard, like the human skin, has to be ventilated, and growers are learning that they must so regulate their vines as to give them a free circulation of air and sunshine.

In Germany, where labor is at the bottom of the scale, viticulture is easily made more profitable than it is with us in the United States, where labor is at the top of the scale. One has to raise a great deal of anything to make it profitable. After climate and saturation, comes the question of labor. Not only must the high cost but the quality of labor be considered with us. We must have a labor that can be depended on—one that will not leave us on the slightest provocation, at the critical moment, and leave our crop to ruin. We know the importance of the proper kind of soil in our work, but after all experiments that have been made, we must come to the conclusion that soil is a thing that can be created. I believe that given anything that will take sunshine, and a little water, one can make soil. In Germany I have seen women carry soil on their heads in a little basket to the tops of the hills, and I suppose they planted vines in it, because there were other vines there.

We must not only have the climate, and the soil, and the water, and the sunshine, and the atmospheric conditions, but we must also have the labor and that is where man comes in. Moisture, heat and light are the parents of our food, and the foster parent, man, can supply the nourishment necessary to make that climate and soil and heat respond; then there is nothing that will prevent successful commercial production of fruit.

I think the best kind of a soil is a sandy soil, but I have seen grapes grown very successfully on soil that was once the bed of a glacial river. I have a friend in North East who has such a soil as this. He is a graduate of the University of Michigan, and very fond of chemistry, so he took the pieces of rock from the glacial river bed and put them through the mill, to make a soil on which he planted a vineyard,—a vineyard as promising as any I have ever seen on sandy soil. Near his land is a cider mill. He covered his rocky land with pomice and so created a quick, warm soil. It was a very discouraging proposition, but it simply shows what can be done. He is realizing from that soil now, from ninety to a hundred and ten dollars an acre. Soil is a relative circumstance; it is the alembic of human labor. Of course, if climate and soil are given us, it is all we can ask.

The story of the vineyard is not one of unbroken profit. It is my experience that an orchard or vine that can be retarded in the spring, will ripen more fruit than one in which the bees swarm in April. We don't want early orchards, and we don't want early blossoms. We want them so regulated, in our belt, that the sun's rays, when it crosses the line, will not start the sap too soon; nor must late frosts nip the vines about six weeks after they have been in blossom. A northern exposure is the best protection against these dangers.

It is now twenty-two years since I began to raise grapes, and the results of my experience can perhaps be illustrated by a story. It was at the time when the administration was trying to start our banking system, and float our national greenbacks, that General Patterson, of Philadelphia, gave a dinner to Salmon P. Chase and some other prominent men. Mr. Chase was in favor of inscribing on the greenbacks a passage from the Bible, or from George Washington's writings, that might inspire the confidence of the people in them. The bankers present, perhaps not familiar with the writings of Washington, could not suggest any appropriate quotation, when General Patterson said he recalled one passage from the Bible which he thought would be satisfactory: "Silver and gold have I none, but such as I have, give I unto thee." It is a good deal so in raising grapes; we don't always have silver or gold, even after we have sold our fruit at high prices. It may be easy to raise five or six tons and make no more money than by producing three or four. You are dependent upon the market, and upon general market conditions. Of course, that brings up the question of the marketing of fruit, which is a rather large question to discuss in such an informal talk as this.

It does not follow that you will have a large amount of money for your fruit if you try to cheat the ground. You cannot take

same year after year. You must put something back. You not from three to five tons off an acre of land, and have it produce the only have to keep land in its natural state of health, but you have to stimulate it, as we stimulate athletes, and our young men in our universities. Our going to school is an artificial way of living. We could live without learning to read. We must do with the soil something as we do with our children and our neighbor's children. We must give the soil an opportunity. We must put the vine into a friendly soil, and then feed it and cultivate it. We have learned that nature starts it off well and that all that remains for us to do us to feed it and cultivate it. We cannot expect the cotyledon to grow unless we feed it. We see in the forest a large dropping of seeds. Those that get moisture from the soil and live in the sunshine, survive. The others, not so favorably situated, die. Most of them die; it is the old story of the survival of the fittest.

We must do something to stimulate and feed the plant. I do not believe that a vineyard of five hundred acres would produce ten tons if left to itself. When the French explorers in the 17th century came down from Montreal and Quebec, and penetrated the great Valley of the Mississippi, they made note of the things they saw. They found the vine growing along the south shore of Lake Erie. Where the wild vine will grow the tame or cultivated vine will grow. If nature has shown that Wyoming County is the place to grow apples, then grow apples here; the same with cherries or grapes or any other fruit. You can always depend on nature's hint. So when Father Hennepin, and other French explorers of that early period record that the wild vine did well on the lake shore, it was a hint to us that it was a good place to grow grapes. The famous vineyards of Erie County now attest the truth that to follow nature is to win success.

But even under the most favorable climatic and soil conditions, the vineyard must be kept fed and stimulated in order to produce well. If neglected one year, it takes several years to get it back to form and the effects of neglect increase in geometrical ratio. From the moment we break soil, until the property passes into the hands of our posterity, it must receive constant attention.

Now, I have noticed that most of the diseases which come to our vineyards are the result of our own carelessness. The law speaks of "acts of God" and "the public enemy;" I believe that our chief enemy in horticulture is our own ignorance and our own cupidity. I can take you through vineyards in Pennsylvania and western New York which have received the most assiduous attention. They are productive because they are healthy and are cared for in a more or less scientific manner.

As soon as the leaf falls you can begin to trim the grape vine. If you leave a wound that will not cover rapidly, and the sun and rain strike it, fungus growth will cover it, and in the open stub insects will hide, and soon there will be a little nest of bacteria. Nature never leaves an open wound unless the vitality of the plant is low. If you do not cover it, she will. If you will take notice, as you pass from Buffalo to Cleveland, you will see many vineyards which show the effect of a fungus growth and insect pests.

They have been neglected or improperly trimmed. Nature has covered them over with disease. These insects and fungus growths are beneficent though they are our enemies. I have discovered larvæ down among the roots of my own vines, although I owned the vineyard for sixteen or eighteen years before I recognized them. If the Horticultural Society and the scientists started in to tell us what they don't know about these insects and diseases, they could tell us a great deal more than when they try to tell us what they know. There is a certain resemblance between a man and his business. I am inclined to think that this so-called technical knowledge, before it is of any value, has to come from the alembic of experiment, experience and trial; and very often the theories of our scientific brethren are of less value than the judgment of the men of instinct. We have in our community a good many Germans from families who came to this country fifty years ago, and later started vineyards. With characteristic German energy they worked their vineyards with precision and profit. The successful man is instinctively what he is—horticulturalist, lawyer, clergyman, whatever it may be, and much of his success is due to his instinctive knowledge, rather than to his scientific training. I would not start in the fruit business the same way I would go into Wanamaker's and order a dozen collars. A gentleman here tells me that he is going into the orchard business because he likes it. That is the only way to do it. Most of us are obliged to check off values, but over against this dollar return there is the healthful surroundings, and the closeness to nature and to mother earth, which you cannot get anywhere more happily than in horticulture.

I love horticulture, and think it has as beneficial an effect on character as the Thirty-nine Articles. Most of us are inclined to look at the dollar value of a thing too much. When Emerson died, a man riding on the train saw in the paper the account of his death. He exclaimed: "Emerson is dead, and he left two hundred and fifty thousand dollars. Why! he was quite a man!" That was the important point—he left two hundred and fifty thousand dollars. That was all he could see in Emerson.

A good vineyard increases the value of the land. Twenty years ago I paid four hundred dollars an acre for my land. I have been offered more for it many times since. A gentleman from Montreal, Manager of the Bell Telephone Company there, a few summers ago, bought a vineyard at North East, for which he paid five hundred dollars an acre. I don't know of any good vineyard that has sold there for less than three hundred dollars an acre—and some sold at that price was not the best land, by any means.

I have known farmers who would persist in raising things that cost more than they are worth. As the old saying has it, they will do as their fathers did. Now, this very land that sells at from three to five hundred dollars an acre, twenty years ago was ordinary farming land, worth from $45 to $120 an acre. It possessed the same vitality then that it does now, but I have no doubt if it had been put out in vineyards seventy-five years ago, it would have yielded no adequate return for the labor, because there was then no demand

for the fruit. We are now in a position, in America, where any first-class fruit will find a market. The middleman may for a time keep us out of our just profits, but we own the land and have the title, and "sometime, we know not how or where, we shall surely come to our own." I am not afraid of overdoing the fruit business. There was a time when we could not have gotten rid of the grapes up in Erie County, any more than you could of your apples here in Wyoming County; but all that has changed. Our people are becoming every year greater consumers of fruit. There is no better investment than first-class fruit land. It is safer and pays better returns than an equivalent amount invested in railroad shares or bank stock. I am more and more impressed, as I grow older, and see the perils of investing money, by the opportunity offered by horticulture to the man who has ten, twenty, or thirty thousand dollars to invest. If it does not make him rich, it will at least keep him from the house that is poorer than his own. Law or medicine are all right, but give me the land. You are always sure of a return if you produce something that some one else wants.

Another important point is the handling and packing of the fruit. I have seen fruit on Chestnut Street from some of our vineyards so carelessly packed that it had been crushed and bruised in transit, and of such poor quality that it for a time destroyed the reputation of the vineyard. I will give you people the credit of doing the right thing in packing your fruit; we do not always do it at the lake shore. We are tricky, and if we find something that is not up to standard, some of us say: "Oh, well, stick it in; I have my check."

If time permitted, and it were worth while, I would like to enter into the large problem of marketing. Our crops seem to be produced, to a large extent, for the benefit of the middleman. Now, we are willing to be the middleman, and if necessary, the two end men also, ourselves. I have seen grapes sell in Philadelphia at four cents a pound, for which we at the shore received seven-eights of a cent. Still, I believe that a man gets about all out of the world that he is entitled to. That is not original with me. General Grant said it, as you will find if you read his Memoirs. Daniel Webster was Daniel Webster; he could not very well have been anything else, because God made him so. If we manage our marketing right, we will get our due share of the returns.

Our scientific friends at Washington are great advocates of spraying for the root worm. It will not harm the worm, they tell us, but it will destroy his posterity. I would rather have something that will destroy the old man himself than turn my vine over to him in the hope of destroying his grand-nephew. I don't believe in sneering at our friends at Washington, however; they are probably doing the best they know how. But this little corkscrew of a beetle that goes through the vine—straight through, if you will let him—if you take him out and expose him to sufficient sunlight, in early June, will shrivel up and die. Just stir him out of the soil, and expose him to sun and air for half an hour, and that will kill the old man himself, as well as his posterity.

There are big bugs that eat little bugs, and little bugs that eat big bugs. Now, nature loves a grape vine, and does all she can to protect it. There are fungus growths that feed on other fungi, and if any man who loves his vine, will take his magnifying glass, and put on his old clothes, and get down into the dirt, he will find that nature is ever protecting her own. Each species has its claim upon her, to which she will respond, if possible.

Nature gave us thirty-two teeth, and the man who chews his food never knows he has any stomach, or any bile, unless his neighbors stir it up. In Couvier's Museum, in Paris, years ago, I saw the skeletons of the old cave dwellers and the Bronze men of Lake Haldstead, in Austria. These men, surrounded by their bronze and stone implements, came down to us with thirty-two sound teeth in their mouths. We are not taking care of our teeth, and we lose them and health. The same thing holds true in our grape vines. I take a rather cheerful view of these diseases which come to our vines. It makes us take better care of them, and look after them, and, as a result, they become more productive. I believe that all the work of our Horticultural Societies, and of our State College, and of our Department at Washington has the same end in view—to give us a healthy vine which will reproduce itself.

Now, Mr. President, I did not write an address. I thought that an informal account of the Lake Erie grape industry might interest you. Nature has done a great deal for that little town of North East; it has only about eight thousand people, but its people ship from twelve to sixteen hundred carloads of grapes every year, not to mention heavy shipments of cherries, raspberries, currants, apples, gooseberries, plums and other fruit, which yield about four hundred thousand dollars annually.

Some time ago a relative of mine gave me an old book on horticulture which was of no interest to her, but which she thought might possibly interest me, since I am in the business. It proved to be Loudon's Encyclopedia of Horticulture, published in England eighty-five years ago, and is very interesting, indeed. We all know that the ancient Romans were interested in horticulture and grew grapes; the recent great historical work by Ferrero gives us a great deal of information about horticulture in the time of the Republic. The planting of the vine was common in the days of the Cæsars. Viticulture came into England in the time of Henry the Eighth.

You read in this old encyclopedia of the curious tools and implements used by the Romans and Greeks in the days of Alexander the Great. Horticulture to-day is very much like horticulture of old. If you read history and study the Bible, you will find that in old time they had the fungus diseases, bugs, and other troubles in their vineyards as we have to-day. One of the most vivid parables of the Old Testament is the parable of the unfruitful vine.

Now, Mr. President, I prize your time too highly to take up any more of it. I may not be able to answer all the questions that might be asked, but if any member of the Horticultural Society has a reasonable question, I will be glad to answer it to the best of my ability.

The President.—If you have any questions to ask Dr. Thorpe, we shall be glad to hear from you, and you may ask him some pretty hard ones.

Mr. Fenstermaker.—What variety is the most profitable?

Dr. Thorpe.—The Concord; it is popular, and freeer from diseases than other varieties.

The President.—Is there anything being done that is making any progress against the root worm?

Dr. Thorpe.—The United States Department of Agriculture has an Experiment Station at North East under experts, and I am told by them that they found an enemy of the grape root worm, and if one has been found, why not millions? There may be many enemies of the worm.

Mr. Lewis.—What four or five kinds would you plant for home use?

Dr. Thorpe.—In their order, the Concord, the Niagara, the Delaware, Moore's Early, Hartford, Ives, Worden. Early grapes (Worden, Moore), pay.

A Member.—Would you name half a dozen of the hardiest varieties to stand ten or fifteen degrees?

Dr. Thorpe.—The Concord, the Ives, a Port Wine grape formerly very much prized for domestic use, and coming into favor again; the Niagara, if protected is a pretty good grape. It is a trifle uncertain, but if successful, it is very successful; also the Delaware, the Worden (early). There are a hundred and two varieties of grapes, of which probably ninety-six are unprofitable except for nurseries.

A Member.—I would like to ask the gentleman whether he has discovered the name of the insect which conflicts with the grape root worm?

Dr. Thorpe.—The grape root worm is as old as the wild grape. If you will go to the woods on Lake Erie you will find it feeding on the wild grape vine to-day. I am inclined to think that it has its uses, like Adversity, and that the only way to overcome it is by cultivation.

Mr. McSparran.—If the Doctor could tell us the name of the parasite that feeds on the root worm, perhaps we might cultivate it while waiting for another remedy.

Dr. Thorpe.—We are not waiting; we are very busy trying to combat the root worm. We spray for it from the 16th to the 24th

of June, according to the weather; we also stir the soil and expose his wormship to the sun, thus destroying myriads. Half an hour's exposure to the sun will cause him to shrivel up and die. We need not wait for an enemy to destroy him; we attend to that ourselves.

A Member.—I would like to ask how we can detect the presence of the root worm?

Dr. Thorpe.—The evidence of the grape root worm is a zigzag path on the leaf; it looks as if the leaf were cut through. That is the track of the feeding insect. After he gets grown he is a beetle, and you will find him on the leaf and in the wood, something like a rosebug. He is protected by nature by being covered with a dun gray coat, so that when he drops on the soil, it is hard to see him.

The President.—Any further questions? If not, we will take up the next subject—"The Making and Use of Concentrated Lime-Sulphur," by Prof. J. P. Stewart.

Prof. Stewart spoke as follows:

THE MAKING AND USE OF CONCENTRATED LIME-SULPHUR.*

By John P. Stewart, *Experimental Horticulture, State College, Pa.*

Lime-Sulphur in the old dilute form has been of service to horticulturists and entomologists since the discovery of its value by F. Dusey, at Fresno, Cal., in 1886. Its first appearance in the east was in 1884, when it was tried in Maryland and pronounced a failure. The ban was partially lifted by the results of a second trial in 1900, but the real beginning of its success in the east dates from Forbes' work in Illinois in 1902.

The material used by Dusey in California was a sheep dip borrowed from a neighbor. To a similar transfer in use, apparently, are we indebted for the beginnings of our knowledge of the value of the concentrated solution as an insecticide. Some sixteen or eighteen years after the first horticultural use of the dilute material, it appears that in Utah it became the practice of certain purchasers of a concentrated dip solution to buy a few extra barrels each season for application to their trees. This dip was prepared by a Stock Food Company, of Omaha, Neb., who corroborated the practice by sending inquiries and samples for trial to several Experiment Stations, and since then they have been regularly marketing their solution as either a dip or insecticide, without modification so far as I have been able to learn.† And it is of interest to note, that although the home preparation of storable dips has long been known, it is only recently a storable insecticide has even been considered.

*For the utensils and practical details see "Appendix" at the close of this paper.

†Letters from Rex Co., June, 1909.

Concentrated lime-sulphur as we know it to-day is a water solution of lime-sulphur compounds, of a bright cherry red or reddish amber color, and of a density that practically may run from 1.20 to probably as high as 1.35 (about 24° to 38° Baume). It differs from the ordinary dilute lime-sulphur chiefly in its ability to be stored, in its freedom from objectionable sediment and solids, and in its availability as a summer fungicide.

Solutions of the densities named above solidify or "freeze" at about 17° F. for the lower density and somewhat below 0° F. for the higher. Our experiments indicate that this freezing is rarely injurious to the solutions, which nearly always recover completely without heating. Their causticity is distinctly less than that of the ordinary dilute material, though without apparent reduction in effectiveness. On continued exposure to air at ordinary temperatures a crust of solids may be formed, which sometimes becomes very thick and objectionable, and at other times remains thin and acts as a protection to the liquid against further solidification. This crust can be readily skimmed off with a fine screen and re-dissolved by heating either in water or in the mother liquid. We have prevented it entirely either by covering the solution with a film of oil, or by immediate storing in closed packages which are filled completely.

The Problem.

The problem of producing a storable lime-sulphur is essentially one of preventing crystal-formation at ordinary temperatures, and of securing a product sufficiently dense to resist freezing and be entitled to storage space. The details of this process are already available in a bulletin of the Pennsylvania Station, so that our purpose here is to present the more general phases of the process and to call attention to some of our reasons for the conclusions given in that publication.

The Materials.

The materials needed are sulphur and a high grade lime. Flour of sulphur is probably preferable to the flowers because of its reduced cost and lessened tendency to collect in pellets, and present indications are that the still cheaper powdered commercial sulphur, of at least 99½ per cent. purity, will be entirely satisfactory in the making of concentrated solutions.

The lime should be as rich in calcium oxid (CaO) and as free of magnesia (MgO) as possible. In our judgment, nothing less than 90 per cent. CaO should be tolerated, though it can be used if necessary, and a lime with 95 per cent. or better of CaO is undoubtedly safer and more satisfactory when it is obtainable. Chemical lime running from 90 per cent. to 95 per cent. is obtainable from the American Lime & Stone Co., of Tyrone, Pa., in lump form for $3.25 per ton in car lots. It can also be purchased in iron tanks or drums, which prevent deterioration, in less than car lots at $3.75 per ton. This is the lime used by us in our experiments and a random sample analyzed showed 95.57 per cent. CaO. Lime of similar quality may be obtained at other places in this State, e. g., the York Valley Lime Co., York, Pa.

The exact extent of the harmful effects exerted by magnesium is not entirely clear. But it is known to materially increase the sediment, and there is some evidence that its compounds are at least partly responsible for some of the very fine crystals that occasionally appear in the concentrate in spite of correct handling in other respects.

The Correct Formula.

After securing a lime of proper character, its amount in relation to the sulphur is of the greatest importance. It has been shown repeatedly in our experiments that the crystallization and most of the harsh sediment in the ordinary dilute material are due chiefly to excess of lime. It is interesting to note, also, that this excess of lime crept into the insecticide immediately after its discovery and apparently without sufficient basis in definite experiments. This may be shown by reference to the first formulas used in Calofirnia.*

	Lime. Lbs.	Sulphur. Lbs.	Salt. Lbs.	Sugar. Lbs.	Water. Gal.
1886, Original formula (sheep dip), ...	80	100	10	20	160
1887, I. H. Thomas, ...	135	100	75	0	300
1887, A. T. Covell, ...	250	100	75	0	300

Thus within a single year we find a rise in lime-content from an amount equal to four-fifths of the sulphur to as much as two and a half times its weight. The serious physical objections to this extra lime are evident and its insecticidal value may well be doubted when we note the success of clear solutions and recall the tests† of lime conducted by Macoun in Canada, in 1899, and by Piper in Washington, which against San Jose and similar scales resulted negatively in all cases.

Assuming then that the permanent clear solution of polysulfids is our objective point in the preparation of lime-sulphur, the first problem is to determine the correct ratio of ingredients for obtaining it. This may be done either by analyzing the product or by repeated series of trials. By the first method, we have found that 59 analyses of the solution of the present dilute material, collected from publications of Haywood, Penny, and Thatcher, show an average lime-sulphur ratio of 1 to 1.96; 12 analyses of our own and commercial concentrates, examined at the Pennsylvania Station by Penny and Rogers, show an average ratio of 1 to 2.443; and 65 analyses‡ of somewhat denser, commercial "dip" solutions analyzed by Emery of the Federal Bureau of Animal Industry, show an average ratio of 1 to 2.538. Thus, as judged by the composition of the product, a ratio of pure materials which is slightly narrower than 1 to 2 is obtained in dilute lime-sulphur while in the higher concentrates a ratio of about 1 to 2.5 is found. These figures show

*Quayle. Cal. Bul. 166, p. 6, with all the formulas reduced to 100 lb. of sulphur.

†Experimental Farms Report, Ottawa, 1900, pp. 122, 123; and Washington Station Bul. 56: 20, 1903.

‡Letters of Chief of Biochemic Division, May and June, 1909.

that a ratio of 1 lb. of lime to 2 lb. of sulphur in the ingredients is well within the limits of actual combination in the concentrated material.

The ratios given above are derived from the actual amounts of chemically pure materials in solution in the finished products. But practically one must deal with commercial limes and sulphurs, and also he must approach the problem from the viewpoint of original ingredients rather than final products. To determine the best ratio of ingredients under actual conditions of preparation, therefore, we tried eleven combinations of which ten are shown in Table I. The lime and sulphur used were commercial and the former contained: 95.57 per cent. CaO; 2.08 per cent. MgO; 1.45 per cent. Al & Fe. The lime, water and boiling periods were kept essentially uniform, while the sulphur was varied from an amount equal to the lime to two and one-fourth times its weight.

Because of the well-known difficulty in dealing with solubilities, of getting identical results even from two products of exactly similar preparation, the problem was dealt with by the method of repeated trials and the elimination of error through the plotting of curves from combined results. From these curves, deductions were made of the true values of the various combinations with results as shown in Table I.

TABLE I.

Approxiate Results Obtainable from the Use of Different Ratios of Sulphur to Lime.

Formula.			Boiling. Min.	Gallons of 1.03 Spray.	Waste,* 1% of Product.	Crystals, after 48 Hours.
Lime. Lbs.	Sulphur. Lbs.	Water. Gal.				
100	100	100	60	342	27	Abundant.
100	150	100	60	585	12.5-13	Abundant.
100	170	100	60	700	5	Many.
100	180	100	60	765	2.25	Few.
100	190	100	60	825	0.5	Trace.
100	195	100	60	843	.125	0, or trace.
100	200	100	60	860	.15	0, or trace.
100	205	100	60	865	.35	0, or trace.
100	215	100	60	860	1-1.5	Few.
100	225	100	60	800	2.6	Few.

From the results here shown, it is obvious that the optimum weight of sulphur for these quantities of water and lime, as determined by the volume of dilute spray and the amounts of waste and crystals, lies somewhere between 190 and 205.

The volume of diluted spray is highest at 205 pounds, but the rise in waste, accompanied by the appearance of slight quantities of free sulphur in the sediment, indicates under the conditions of the experiment at least that the optimum has been passed. The waste is smallest at 195 pounds, and from this one viewpoint it is

*The "waste" mentioned in the table was the part of the product that would not pass through a strainer of about 50 meshes to the inch, after 48 hours. It was composed largely of crystals and harsh residue. This does not take into account the very fine sediment that went through with the liquid.

best. But the waste is very slightly greater at 200 pounds, and from the viewpoint of freedom from crystals and waste, volume of spray, and simplicity of formula, 1-2-1, it is best. It is therefore recommended for general use in preparing concentrated solutions.

There is no serious objection, however, to any of the formulas with 180 to 205 pounds of sulphur, and where the material is to be used at once or if the purity of the lime is questionable, it may be desirable sometimes to approach the lower amounts.

Optimum Concentration.

With the proper ratio of ingredients determined, the next question is what is the most efficient or optimum concentration. In the home product, the greatest density that is obtainable and permanent is not our goal. We wish rather to obtain the concentration which best utilizes the materials and is of storable density. The best utilization is here considered to be that which obtains the most tree-spray of uniform density from a given amount of sulphur and lime. A storable density is considered to be one which will permit a dilution of at least seven volumes and will stand at least 15 degrees of frost (17° F.) without freezing.

In answering the question of optimum concentration for a formula in the proportions of 100 lbs. lime to 200 lbs. sulphur, we tested concentrations at intervals of about five gallons for volumes varying from 128 gallons of concentrate down to 65 gallons. The method of trials, curve-plotting and deduction was also used here with results as shown in Table II.

TABLE II.

Approximate Results Obtainable from Different Concentrations.

(Using 100 lbs. Lime to 200 lbs. Sulphur.)

L.-S. Lbs.-Lbs.	Water. Gal.	Boiling. Min.	Density at 60 Deg. F.	1.03 Spray. Gal.
100–200	128	20	1,182	780
100–200	125	25	1.198	825
100–200	120	30	1,223	896
100–200	116	35	1.233	904
100–200	115	36	1.234	900
100–200	112	40	1.238	892
100–200	110	43	1.240	881
100–200	105	50	1.243	853
100–200	100	56	1.347	825
100–200	95	63	1.252	800
100–200	90	70	1.256	771
100–200	80	85	1.269	718
100–200	75	94	1.276	690
100–200	70	104	1.284	663
100–200	65	113	1.293	636

From the results obtained it was apparent that the most efficient or optimum concentration differs with the demand. Under the conditions of the experiment, which were eccentially those met in practice, the best utilization of materials occurred at 115 or 116 gallons of concentrate.* This volume gave an average density of

*The lack of fuller utilization at the higher volumes of concentrate was evidently due to shortness of boiling periods at those volumes.

about 1.23, which permits a dilution of 1 to 7 2-3 for a 1.03 spray, and does not freeze above 15° F. It can be stored satisfactorily and is to be recommended where storage conditions are not exacting.

But where limited space and low temperatures are to be met, the densities found at 70 to 80-gallon volumes of concentrate are preferable. Higher densities may of course be obtained by greater concentration, 1.385 being twice reached in our experiments. But under orchard conditions, at least, these higher densities are all obtained at the expense of final volume of spray, and in some cases they have been difficult to maintain.

Thus for the home product, the best concentration is evidently a matter of viewpoint. For the best utilization of materials and fair storage qualities, 112 to 120-gallon volumes are preferable. For better storage and fair utilization of materials, 75 to 80-gallon volumes may be best. For average qualities of both utilization and storage, 100 to 110-gallon volumes are best, as well as simplest, and are accordingly recommended in this paper for general conditions.

With the commercial product, however, where freight rates and the cost of packages must be considered, we believe a density not less than 1.30 to be preferable. It is entirely permanent if properly made and protected from the air, and its ease of dilution in obtaining the principal sprays further recommends it. We have here a product of 1.336 density (or about 36½° Baume), which was made on February 1, 1909, and which amply proves the permanence of solutions even stronger than the 1.30 density recommended. Other requirements that will be met by the best commercial firms are that their product shall *contain clear solution only and have nothing but lime, sulphur and water in its ingredients.*

When we reach the actual boiling of the materials, the procedure is not greatly different from that followed in the making of the ordinary dilute material.* The utensils needed are a cooker, strainer, measuring stick, and hydrometer. Cookers made of iron or wood are preferable. If steam is used it should be in closed coils, rather than live steam, at least in the later stages of the process, since it is desirable that the final volume be under control and be decreasing rather than increasing. The strainer should have not less than thirty meshes to the inch and 36 or 40 are preferable. The measuring stick is so marked as to enable one to make the necesssary additions of water and get the final volume most readily. A hydrometer of the ordinary float type with a range from 1.000 to 1.35 is ample, and it may be fitted with both the specific gravity and Baume scales. Where but one scale is to be had, the former is preferable.

In making the concentrate, we have found it much more convenient, and at least equally effective, to add the dry sulphur to the slaking lime rather than adding it in the form of a paste. Care should be taken, however, to maintain a moist condition of the mass

*A detailed description of the utensils and process of making concentrated lime-sulphur is given by the writer in Bul. 92, of the Pennsylvania Station. (On p. 12, line 24 of that Bul. read "boil again to 50 gallons" instead of 60 gallons; also see "Appendix" to this paper.)

and to thoroughly mix it during the slaking, paying special attention to the breaking up of any lumps that may appear during the process of boiling.

Time of Boiling.

The material should be boiled until the sulphur granules are evidently dissolved. This fact is best determined by dipping and slowly pouring some of the material, under close observation. In many cases we have obtained as complete dissolving of the sulphur in less than 40 minutes of actual boiling as was obtained by any time up to 2½ hours. We know of no useful purpose to be served by continuing the boiling for any considerable length of time after solution has occurred, while on the other hand the amount of sulfites and sulfates, and therefore the sediment, is increased by unduly prolonged boiling. However, if a time of boiling were to be named, it is probable that a period of 40 minutes to one hour will be satisfactory, at least until the question can have further study.

The finished product, made by using 100 lbs. lime, 200 lbs. sulphur and 100 gals. of water, will have an average density somewhat above 1.24 (or about 28½° Baume). If the lime is good and the manipulation right, less than one per cent. of the product will fail to pass through a strainer as fine as 50 meshes to the inch at the end of 48 hours or more. The material that passes through, however, is not all clear solution. Along with the latter there is formed a very fine sediment or sludge which even after settling for some days usually permeates the solution from a fifth to about a third of its depth. This sludge is made up largely of sulphites and sulphates of calcium, together with some free sulphur and lime, and whatever impurities the lime and sulphur contained which were not removed by the strainer.* The magnesium, iron and aluminum, dirt, etc., are largely found in it. It is of doubtful value as a spray material * but the difficulty of its economic removal and the apparent lack of objectionable mechanical qualities have led us to disregard it in the home preparation.

If it is desired to obtain only the clear solution, however, this may be done by letting the product settle for about a day, drawing off the clear portion and straining the remaining liquid and sludge through a moderately fine cloth placed inside of the strainer. The sludge may then be washed free of any further valuable materials by pouring through it the water to be used in making the next lot.

The Process of Diluting.

Having now our concentrate prepared, its proper dilution becomes a matter of importance. In the application of any concentrate, either home-made or commercial, it is essential that a definite method of dilution be followed. Two solutions may look exactly alike and yet differ widely in density, so that any accurate method must be based primarily on the density of the concentrate that is being diluted. Moreover, we believe that recommendations based on the

*After the work of Bosworth & Parrott, Geneva Station, N. Y.

density of diluted spray are preferable to those based on the number of dilutions even when accompanied by a statement of the concentrate's density.

Accurate dilution is very simple and easily accomplished with the aid of a hydrometer having the specific gravity scale. Sprays of any desired density may be obtained from any concentrate by simply getting the reading of the concentrate and dividing the decimal of this reading by the decimal of the spray desired. For example, if the reading of the concentrate is 1.27 (about 31° Baume), to get a spray of 1.03 density we divide the .27 by .03 and obtain 9, which is the number of dilutions required, and which of course is obtained by adding *eight* volumes of water. In this we are simply applying the general fact that the densities of solutions heavier than water vary inversely with the number of dilutions.

The workings of the process may be seen further in the following:

(a) To determine number of dilutions.

$$\text{Formula: } \frac{\text{Decimal of concentrate}}{\text{Dec. of Spray Desired}} = \text{No. of dilutions.}$$

$$\text{Examples: } \frac{1.24}{1.03} = 8, \text{ or } \frac{1.25}{1.01} = 25.$$

$$\frac{1.30}{1.03} = 10, \text{ or } \frac{1.30}{1.005} = 60.$$

(b) To determine the density of spray used.

$$\text{Formula: } \frac{\text{Decimal of concentrate}}{\text{No. of Dilutions}} = \text{Decimal of Spray.}$$

$$\text{Examples: } \frac{1.26}{10} = .026, \therefore \text{ Spray} = 1.026.$$

$$\frac{1.27}{50} = .0054, \therefore \text{ Spray} = 1.0054.$$

This method gives final sprays of definite density and the importance of this is obvious when we consider the relatively small margins between safe and unsafe densities in the use of these solutions on foliage. It is also evident that any statement of dilution such as 1 to 40 or 1 to 60, without an accompanying statement of the density of the material being diluted is indefinite and correspondingly unsafe.

With Baume hydrometers, the dilutions are obtained indirectly, either by conversion into the Specific Gravity scale or by means of a special dilution table. In the latter case, however, a table is likely to be needed for each density of spray desired.

Use of Sulphur Sprays.

The range of usefulness of sulphur sprays is unusually great. Their value as contact insecticides is already well established, though

some of the egg-laying scales, such as the terrapin (Eulecanium) and sometimes the oyster-shell, are not as well controlled by the dormant applications as might be desired. The latter, however, was very easily killed with a 1.02 solution at hatching time which occurred on June 12 this year at the Pennsylvania Station. On the other hand, our results with a similar strength against the apple aphis after it had reached the leaves were unsatisfactory, owing to the difficulty in wetting the insects even when completely immersed. From the work of Gillette and Taylor in Colorado, however, these insects can be controlled in the egg stage by a spray of about 1.04 density, applied before bud-opening.

But it is in the capacity of summer fungicides that lime-sulphur solutions are now most promising. This is chiefly because of the severe damage often resulting from the use of Bordeaux, which has created a strong demand for an efficient fungicide that is free from its injurious effects. Especially is such a material desirable in controlling apple scab on varieties like Jonathan, Hubbardston, Gano and others whose fruit is often badly russeted by the Bordeaux spray. It is also very desirable in controllling the brown rot of stone fruits, whose tender foliage in many cases renders the use of Bordeaux impossible.

At the present time, the results of certain experiments indicate that lime-sulphur solutions properly diluted are likely to supply this need. It is not to be inferred, however, that they are to supersede Bordeaux entirely. The latter will undoubtedly remain our standard fungicide for many purposes, but with its limitations more sharply defined. And for special cases like those above, lime-sulphur solutions *of known ingredients* are now very promising.

Dilution for Different Uses.

The proper dilutions for various purposes, especially for summer use have not yet been fully determined. Two questions are evidently involved: (1) the strengths that the foliage will stand; and (2) the strengths actually required to control the pests. With these questions answered, it would be easy to decide upon the best practical orchard strengths. In attempting to approximate these strengths at the present time, we conducted foliage tests with our material and also considered all definite, available results with similar sprays elsewhere.

In our tests the spray was applied at ten different strengths, ranging from 1.005 to 1.020, to the foliage and fruit of apple, cherry, grape, peach, European plum and Japanese plum. The results from six of these strengths, applied June 12, 1909, are shown in Table III. No addition of lime was made. The sticking qualities of the spray were excellent, since in spite of abundant rains the spray was very evident on the leaves for several weeks after application. In the table, whenever two figures are given in the estimate of damage, the lower one comes closest to my own opinion as to the true extent of the damage, but the higher figure is added in order to be entirely safe.

TABLE III.

*Influence of Different Strengths of Lime Sulphur * on Foliage.*

No.	Density of Spray.	Per Cent. of Injury to Foliage. Estimated after Twelve Days.					
		Apple.	Cherry.	Grape.	European Plum.	Japanese Plum.	Peach.
1	1.005	0	0	0	5–10	5–10	10–15
2	1.009	0	0	0	10–15	10–15	10–15
3	1.012	5	..	0	10–20	40–45	25–30
4	1.015	15–20	..	0	10–20	50–60	40–45
5	1.018	5–10	5	5	20–30	80–85	40–50
6	1.020	10–12	5	5	.....	.....	50–60

As shown in the table, no injury of importance was caused to the first three fruits by any of the strengths used, excepting in No. 4, where a number of young apple leaves had been sprayed heavily on the under sides with a 1.015 solution. This showed a 15 per cent. to 20 per cent. reduction in foliage--efficiency.

In the case of the tenderer stone fruits, on the other hand, it will be observed that some leaf injury occurred even with the lowest strengths. And from our results it would appear that any protection of the fruit in the peach or plum is likely to be secured at some sacrifice in foliage. Our results indicate that solutions as strong as 1.009 may be used for a single spraying under normal weather conditions without exceeding a 15 per cent. reduction in foliage-efficiency. If this sacrifice is considered not too great for the sake of the fruit, we believe that such a strength can be used. But from results obtained by Wallace at Cornell, with much weaker solutions it is probable that such strengths are not really needed to control brown rot, and until further work is done it may be best to consider a density of 1.005 as the maximum for peach and plum foliage, with a minimum for trial as low as 1.003 or possibly even 1.002.

But a striking thing in the effects of the spray was the fact that many thoroughly sprayed leaves escaped injury even at the higher densities, while many others showed considerable injury at the lowest strengths used. This condition was partly explainable on the basis of location of the spray on the leaf, the under surfaces proving much more vulnerable than the upper. But, undoubtedly, the main explanation is to be found in the fact that when applied heavily the spray collects in drops on the leaves (especially on the margins), and by evaporation is concentrated to injurious densities. Thus the *density of the spray as applied* may not be the controlling factor in foliage injury, but rather it is the *density attained on the leaf before evaporation is complete.* This depends on (1) the abundance of the application; (2) the density of the material applied; and (3) the size and location of the drops retained by the leaves. The first two factors are easily modified, within certain

*It is not to be inferred that such results as these are regularly obtainable with the commercial solutions, because of the frequent presence in them of foreign materials such as salt, as shown by the Geneva Station, N. Y.

bounds, but the third is more difficult. If the spray could be kept more evenly spread over the leaf surface, or if the larger accumulations of liquid could be removed before drying, the trouble would undoubtedly be greatly lessened.

In the case of the peach, where the injury is most severe, the glaborous and slightly waxy foliage facilitates the collecting of spray into drops, which accounts for the prevalence of the "shot-hole" injury in the leaves. It also suggests the possibility of materially lessening the injury by jarring off the excess liquid shortly after spraying, since the pubescence on the fruit retains the spray needed. It is doubtful, however, whether this would prove commercially practicable, hence the need of further experiments and of caution among orchardists in dealing with these fruits.

From all definite results at present available, the following table of uses has been prepared.

TABLE IV.

Times and Strengths of Spray for Various Purposes.

Insect or Disease.	Spraying Times.	Densities of Spray.
San Jose Scale,* ..... Oyster-shell Scale,* ...	Trees dormant, but best in fall or spring.† At hatching time,	1.03 for regular annual control. 1.04 in bad cases, especially on old apple trees. 1.02.
Blister-mite,* Plant lice eggs, Peach leaf curl,	Just before buds open,‡	1.03 to 1.04. Latter strength for aphis eggs.§.
Apple and pear scab, Apple worm, add arsenical in 2 and 3.	(1) Blossoms beginning to show pink. (2) Within a week after petals fall. (3) About three weeks later.	1.01. May be varied by .002 or either way as results direct.
Cherry leaf spot,	Three sprayings, a month apart, beginning with signs of infection.**	1.01, or slightly weaker.
Peach scab and brown rot of stone fruits. (Experimental as yet.)	(1)** Three or four weeks after petals fall. (2) Half-way between (1) and (3). (3) Two weeks before fruit ripens.	1.003 to 1.005. May be varied .001 either way, as results direct. On peaches and plums, limited trials only, testing effect on foliage by applying to a few trees several days before regular applications.

While it is believed that the densities recommended in this table will generally prove efficient and safe under average eastern conditions, yet we have observed occasional injury from third and fourth applications when the earlier applications of the same strength of spray had proved entirely safe. Also in connection with the addition of arsenicals, we have found that the decomposition which

*Also controlled by properly made miscible oils. (See Bul. 86, this Station, for preparation.)

†March sprayings showed a 41% advantage over those in January, in Forbes' results. Ill. Bul. 107.

‡See New York Geneva Bulletins 283 and 306.

§Colorado Bul. 133, p. 27.

**Times recommended by Scott for control with self-boiled lime-sulphur. (With slight modifications.) Bureau of Plant Industry, Circular 27, 1909.

follows the addition of lead arsenate and Paris Green, is practically avoided by the use of arsenite of lime and that the burning which usually accompanies the use of this material can be largely avoided with a slight modification of the Kedzie formula. This modification consists in reducing the sal soda to about one-fourth the amount in the above formula, and then using the clear arsenite-of-soda solution in slaking an amount of lime sufficient to render the arsenic insoluble. By this method, we have succeeded in reducing the soluble arsenic to a mere trace,—.013 per cent. after 30 minutes agitation in water with air bubbling through it.

A number of important questions still remain for further study in connection with lime-sulphur solutions. We are not now certain as to just what the active agents are, nor how they act either in the killing of insects, fungi, or leaves. Neither are we yet satisfield with our knowledge of the minimum practical strengths for fungous and insect control.

Appendix.*

Utensils.

The equipment needed for making and diluting concentrated lime-sulphur consists of a cooker, a measuring stick, a hydrometer, and a strainer.

The Cooker.—The cooking may be done either by fire directly, using an ordinary iron kettle, or by means of steam coils in vessels of either metal † or wood, but preferably not with live steam because of its addition of water instead of reduction. A cooker used by us and found very satisfactory is shown in Figure 3. Steam jacketed kettles, with mechanical agitators, are very satisfactory when steam is available.

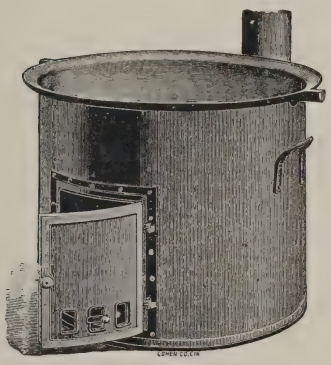

FIGURE 3
A convenient cooker for use in making concentrated lime-water.

It may be obtained from the Farmers Supply Co., Philadelphia, or from Montgomery Ward & Co., Chicago, and the larger sizes are preferable if much material is to be made.

This cooker is valuable because of its economy of fuel, its disposal of the smoke, and especially on account of the easy control of the fire it affords by means of the door and damper. It might be improved by the addition of a spigot in the bottom, reaching through the jacket and thus greatly facilitating the removal of finished products.

The Measuring Stick.—This is for use in determining the volume of water in the kettle at any time by means of its height. It is of importance in order to know when the material is boiled down

*This is added for concise reference as to details. It is pages 10 to 14 (with slight modifications) of the writers Bulletin 92, of the Pennsylvania Experiment Station.

†Copper implements are objectionable in all operations with lime-sulphur and should be avoided.

far enough, and is also a convenience in adding the right amounts of water. It may be made by planing down a good lath to ⅜″x⅞″ in cross-section and then accurately marking on it the heights reached in the kettle by 6, 8, 10, 12, etc., gallons of water. It is will to notch these marks with a fine saw, making those heights prominent that will be most used.

The Hydrometer.—This is an instrument very much like that used in testing acids in dairy work, but with a wider range, and is used in determining the density of the finished product preparatory to dilution. A convenient type of hydrometer for liquids heavier than water, is obtainable from George D. Feidt & Co., Philadelphia; or from Elmer & Amend, New York City; or Bausch & Lomb, Rochester, N. Y.

These instruments are made in two scales, the Specific Gravity and the Baume, both of which may be placed on the same instrument. Densities are expressed by the former in decimals and by the latter in degrees. The Baume scale is somewhat easier to read, but the other is more convenient to use, inasmuch as the required dilutions can be obtained more directly from it. The range desirable is from 1.000 to 1.35 on the Specific Gravity scale or from 0 to 36° Baume. Such instruments have been put up according to these specifications, and may be obtained from the firms indicated above. They are simple in use and indispensable for accurate dilution of concentrated solutions.

The Strainer.—Any ordinary lime-sulphur strainer of about 30 meshes to the inch will be satisfactory for this work. A satisfactory type is shown in Figure 5.

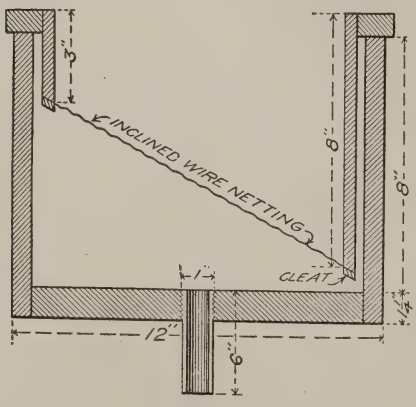

FIGURE 5

A satisfactory strainer easily made. Wire cloth for the screen may be obtained from Hall & Carpenter, Philadelphia.

It may be used for either lime-sulphur or Bordeaux, and the central portion lifting out greatly facilitates the cleaning.

If the strainer is to be used for lime-sulphur only, tinned iron wire will be best for the screen. If, however, it is used for both Bordeaux mixture and lime-sulphur, brass wire is best. If kept properly cleaned immediately after use (which should be done with all metallic implements when lime-sulphur is used), it will last indefinitely. An improvement might be made by sloping the upper surface of its floor toward the spout, and its size may well be increased where large quantities of material are to be strained.

Materials.

Sulphur and lime may usually be obtained locally in sufficient quantities and purity to meet the demands of concentrated solutions. In larger quantities, the sulphur may be obtained from: The Bergenport Sulphur Works, New York City; Powers-Weightman-Rosengarten Co., Philadelphia; or Thomsen Chemical Co., Baltimore. Prices vary from $2.15 to $2.60 per 100 lb., depending on the kind and quantities ordered. For best results the lime should in no case fall below 90 per cent. in purity and preferably not below 95 per cent.*

Bringing together and applying the foregoing considerations, we have the following method of preparation:

How to Make Concentrated Lime-Sulphur.

Materials:

50 lbs. best stone lime (90 to 95 per cent. CaO).

100 lbs. sulphur (flour or powdered commercial 99½ per cent. pure).†

50-55 gallons of water, *at finish.*‡

Directions.—Put 10 gallons of water in kettle and start fire. Place lime in kettle. After slaking is well started, add the dry § sulphur and mix thoroughly, adding enough water to maintain a thin paste, which requires about five gallons. After the slaking and mixing is completed, add water to the height of 50 gallons on the measuring stick, bring to a boil and stir until the sulphury scum practically disappears. Then add water (preferably, but not necessarily, hot) to the 65-gallon|| height and boil again to 50 gallons, if storage space is limited. If it is not limited, a little more water should be added the third time and boiling stopped at about 55 gallons. The material should be kept well stirred, especially during the early stages of the process, and any lumps of sulphur or lime should be thoroughly broken up.

The total time of actual boiling should be about an hour, though a ten-minute variation either way is not objectionable providing the sulphur is evidently dissolved. This fact is best determined by dipping and slowly pouring some of the material. The amounts of water indicated above are ample for one hour's fairly vigorous boiling, with the finishing volumes as indicated. If it is not at the desired height at the close, it may be made so by more water or more boiling, and either the amount of water in the third addition or the

*The lime used in all this work was commercial and contained: CaO, 95.57 per cent.; MgO, 2.08 per cent.; Fe and Al, 1.45 per cent.

†The sulphur may be reduced as low as 90 lb. to this amount of lime without unsatisfactory results, but the waste and tendency to crystallize is increased and the density is of course decreased for these volumes of finished spray.

‡This amount can be conveniently made in a 75-gallon cooker. Other amounts in proportion.

§This is more convenient than to previously moisten the sulphur and final results are as good or better, if the stirring is well done.

||If cooker is large enough, the whole amount of water may be added immediately after mixing in the sulphur, thus avoiding the check in boiling, though greater care is required to prevent boiling over.

vigor of boiling can be so modified in later trials as to enable the total to be brought to the desired height approximately at the end of the hour.

The finished product may be immediately poured or strained into a barrel or settling tank or into the spray tank. The straining is merely a safeguard to prevent any possible clogging because of imperfect materials or failure to break lumps in the sulphur. When properly made, the amount of sediment left in the strainer is insignificant, being less than 1 per cent. as shown in Table I, and may be thrown away. To avoid any considerable loss of materials, however, the sediment in the strainer can be washed with part of the water used in making the next lot, simply pouring the water through the strainer into the kettle, and any lumps of sulphur discovered may be broken up and used again.

If the straining is not done, the whole product may be put into a settling tank or barrel and the clear liquid drawn off later as required. This process, however, is likely to lose efficient liquids in the sludge, as well as the fine sludge itself, which may be of value in several ways, and is of no apparent hindrance in the spraying.

The crust which forms on the finished material, is prevented by immediately covering the solution with a layer of oil about an eighth of an inch thick, and avoiding unnecessary exposure to air in the transfer from kettle to storage tank. An ordinary paraffin oil was very satisfactory in our work, but there is reason to believe that any other oil, not injurious to trees nor likely to take fire at boiling temperatures, may be used with equal success.

The crust may also be prevented by immediate storage in tight, closed vessels, filling them *completely*. But partially filled vessels are likely to develop some crust, upon continued exposure.

The finished product should be protected in storage from unduly low temperatures, though solutions of 1.28 density (32.1° Baume) do not freeze above 5° F., and usually recover completely after they are frozen. Less dense solutions freeze at higher temperatures, with recovery similar. Lower temperatures, however, are not frequent within six weeks or so of bud-opening, so that little difficulty is to be expected. In case some objectionable crystals form, they are easily strained out and re-dissolved by boiling in a little water, and may then be either returned to the solution or to some other one and the first diluted as usual without them.

A Member.—Can you tell me where I can buy the lime?

Prof. Stewart.—From the American Lime & Stone Co., Tyrone, Pa., at about $3.25 a ton, in car lots. You can also get it from the York Valley Lime Co., York, Pa. I would get a lime that runs as high in calcium oxid as is possible in car lots, around 95 per cent. CaO if you can get it, and one that contains as little magnesia as possible.

A Member.—Do you mean to say, Professor, that there is a time when there is no sediment whatever?

Prof. Stewart.—No; there is always some sediment, but there is a time when there is the least sediment, which is soon after the

dissolving of the sulphur granules first becomes complete, and that is the time to stop boiling.

A Member.—About how long?

Prof. Stewart.—In some cases I have obtained as good a solution after forty minutes of actual boiling as at any time up to two and a half hours. In general, however, I should say that boiling from forty-five to sixty minutes should be ample to get the sulphur into solution. But I should consider that the point of evident solution of the sulphur is a better indicator of the time to stop boiling than any number of minutes.

A Member.—Do you put your lime and sulphur all in at the same time?

Prof. Stewart.—The sulphur is added to the slaking lime.

A Member.—Do you run live steam directly into it?

Prof. Stewart.—No; because in that way we can not so well control the final volumes. I should prefer bottom heat or steam jacketed kettles, or steam in closed coils.

A Member.—But if you are fitted up to do so, you can use live steam?

Prof. Stewart.—Yes; but I would not advise it.

A Member.—At what pressure?

Prof. Stewart.—Anything you like, so far as I know.

A Member.—From two to fifteen pounds?

Prof. Stewart.—Yes; though the latter would add less water in condensation after boiling started.

A Member.—When do you test it with a hydrometer?

Prof. Stewart.—When you come to dilute it.

MEETING OF THE EXECUTIVE COMMITTEE.

The Executive Committee was called together during the noon recess to receive a message from Dean Thos. F. Hunt, through Prof. Watts, assuring the Association of the willingness of the Pennsylvania Experiment Station to work for and with the Association in the Horticultural interests of the State.

He advised that plans were being made to put additional help on the work of Experimental Horticulture, having in view experiments with some other fruits. The Executive Committee was asked to designate what, in their opinion, would be the best line of investigation to pursue. After some discussion, the committee decided to recommend that careful work on one fruit would probably bring results of more value to the growers of the State than the same money and energy spread over several . It was their feel-

ing that peaches, being next in commercial importance to apples. should receive attention next, provided the important questions of peach culture were not found to be already under careful investigation by other states. In this case it might seem best to take up the study of some other of the stone fruits.

WEDNESDAY, JANUARY 12, 1910, 1.30 P. M.

President Hiester in the Chair.

The President.—The meeting will please come to order. We will now resume the discussion of Prof. Stewart's valuable paper.

A Member.—What arsenite would you recommend to be used with lime sulphur as a summer spray?

Prof. Stewart.—Personally, I should use arsenite of lime, prepared as indicated in our Bulletin 92. Arsenate of lead decomposes both itself and the lime-sulphur, besides being much more costly. It has been used with good results practically, however, so that we cannot condemn it completely.

Mr. Engle.—We have heard a great deal of the efficiency of the spraying, but is there anything to show when it has been applied? That is one of the chief defects of the sulphur solution. Can you not find something that will leave a mark on the tree to show where it has been applied?

Prof. Stewart.—The addition of six pounds of slaked lime to fifty gallons of water will give a marker and show where it has been applied. Its addition, however, is objectionable mechanically and also chemically. Some of our largest orchardists are abandoning the marker.

Mr. Engle.—"Never Scale" comes in a powder which is diluted and then applied the same as this. The agent was at our office recently and showed a twig to which it had been applied. It showed quite white where it had touched.

Prof. Stewart.—It ought to leave a good mark, inasmuch as its analysis shows a high content of lime.

Mr. Eldon.—Will the addition of lime paste tend to throw down crystals?

Prof. Stewart.—Yes; the addition of lime has a detrimental influence. When we add it, we increase the thiosulphates, and apparently decrease the proportion of higher polysulfids. We also increase the tendency to crystallize, and add to the amount of solids tending to clog the nozzles. Thus you see its addition is objectionable, but if you still want a marker you can use it.

Mr. Engle.—The trouble is that a great many people do not apply it thoroughly, and a marker shows where it has been applied and where not.

Prof. Stewart.—That is one argument in favor of the marker. The sediment in the home preparation partially relieves this difficulty.

Mr. Engle.—At the recent meeting of the Nursery Inspectors we heard some remarks by Prof. Headden on the danger of getting an excess of arsenic and injuring the soil by the arsenate in it. Would there be the same danger with the arsenite of lime?

Prof. Stewart.—That is a question I would not undertake to answer finally. It has not been shown that we are in any particular danger of arsenical poisoning here in the east. The question is being worked upon now by Prof. Quaintance and his men at Washington. From Prof. Headden's work I would say that there is just as much danger from arsenite of lime as from arsenate of lead where conditions are right for it, but we are not in the same danger in our soil as they are in the alkali soils of the west.

Mr. Engle.—He was quite positive in his opinion, and proved it by exhibiting branches of fruit that showed traces of it. He did say, however, that he thought no one could eat enough apples to get arsenical poison from them.

Prof. Stewart.—Yes; I have had some correspondence with Prof. Headden on this subject, though in particular connection with another point. It will be brought out in my orchard fertilization talk later.

The President.—We will postpone further discussion along this line until after Prof. Surface has made his address.

Mr. Estabrook.—I desire at this time to offer a resolution, which I will read:

"*Resolved,* That in view of the very helpful work that is being done at State College for the Horticulture of the State, that the State Horticultural Association of Pennsylvania do all in its power to obtain a Horticultural Building at State College."

Prof. Surface.—I move the adoption of this resolution by this organization.

Mr. McSparran.—I second it.

The motion was unanimously carried.

The President.—We are now ready to receive the report of the Committee on Nominations.

Mr. Walton.—The Committee on Nominations desires to make the following report: President, Gabriel Hiester; Vice-Presidents, William T. Creasy, Robert M. Eldon and F. H. Fassett; Secretary, Chester J. Tyson; Corresponding Secretary, William P. Brinton; Treasurer, Edwin W. Thomas.

Mr. McSparran.—I move the report be received, and the committee discharged.

Mr. Briggs.—I second that motion.

The motion was carried and the committee discharged.

The President.—The election of officers is now in order. Now, it is understood that you are not obliged to vote for these men selected by the committee. You can vote for any one you please.

Mr. McSparran.—Since there is only one ticket in the field, I move we make it a unanimous vote, and that Mr. Briggs be selected to cast the vote.

This motion was properly seconded, and carried. Mr. Briggs cast the official ballot, and the nominees were declared elected.

The President.—I want to take this occasion to thank you for your confidence in me, in re-electing me; I trust that I shall prove worthy of it.

We have been invited to exhibit at the meeting of the Live Stock Breeders to be held in Philadelphia in February. It strikes me that this would be a most excellent advantage for the men who are growing fruit commercially in Pennsylvania, and I would like to have an expression from the exhibitors before the close of our meeting. How many of you are willing to allow your fruits to be exhibited at Philadelphia? It would cost the Society but little, and the exhibitors nothing but the packing of the fruit. We would like to have the names of as many of the exhibitors as are willing to allow their fruit to go to Philadelphia.

Mr. McSparran.—I am a member of the Breeders' Association, and on that occasion, I think it is the 2d, 3d, and 4th of February, they will have a most excellent corn show, and our fruit exhibit would fit in very nicely with the corn show. I am sure the Breeders' and Dairymen will take excellent care of your exhibits, and see that they receive the proper publicity.

The President.—I am now going to introduce to you a gentleman who admits he is a crank on cover crops. You can decide that for yourself when you hear him. I have the pleasure of introducing to you Mr. Symthe, of Benton Harbor, Michigan, President of the Michigan State Association.

COVER CROPS.

By President R. A. Smythe, *Benton Harbor, Mich.*

No one has a right to leave this earth in a worse condition than he finds it, and it should be his pride to say when Father Time calls, that the world has been made better by his having lived.

True! we are not all Edisons, Marconis, Burbanks, or many others that I could enumerate. But each man is responsible for the one life given him, and must answer for the development of his individual talents. I am not stating this from a sentimental or spiritual standpoint, but purely from the material and practical side: I wonder how many of us think of this as we go on year after year robbing the soil of everything we can, without returning anything to improve and rejuvenate it. Now, is this just to ourselves or to the generations that are to follow us? No, I think not. Why is it we hear of the deserted or abandoned farms in many of the eastern states, where farms with good houses, barns, out buildings, and

other improvements can be bought for almost a song What is the reason? Some one must have made money enough on these same farms to have made these improvements, or they would not be there. But why are they abandoned? The land has become so impoverished by the continual cropping that it is worn out, and it is impossible to make a living on these farms. Can they be made again profitable? Yes! with proper cover crops and other fertilizers. Many people would prefer to go out west and take virgin land, and start anew, but I would rather not; I would stay with the old farm, with all the memories and associations connected with it, and bring it back to a profitable investment. The trials and discomforts of going into a new western home do not look attractive to me. If you have been robbing your land year in and year out—stop it, and begin to put something back, grow something on this land which can be plowed under, and will improve it every year, and in a few years you will have your farm in a fine condition and will be with your friends and relatives.

In my few remarks I cannot enumerate the many ways in which you can improve your lands with fertilizers, manures, clover, peas, beans, and other legumes—saying nothing of cultivation, drainage, etc. I will only endeavor to impress upon you the value of growing cover crops on all cultivated orchard and vineyard lands. When I say "cover crops" I do not mean catch crops such as oats, rye, barley, wheat, corn and other things that are planted late in the season and grow until frost comes; these are only grown to stop the rapid growth of the tree or vine, and help ripen the wood before heavy freezing comes, also to help catch and hold the snow in the winter. A "cover crop" is one that is planted in the late summer and grows and lives through the winter, coming out in the spring, making a large growth to be plowed under. The different clovers and vetches are the only cover crops of real value and as my experience has been more with vetch, I will confine my talk more closely to it.

From my own observation and what I can gather from all the State and United States Bulletins there is nothing quite equal to the hairy vetch as a nitrogen gatherer and humus producer. The terms "Winter," "Hairy," and "Sand" Vetch are synonymous, but as the plant is covered with a fine hairy growth, it seems the term "Hairy Vetch" is the most appropriate. There are a score or more of different Vetches, but only two varieties of value are grown in the United States, and really only one of value in the colder climates. Hairy Vetch was first introduced into America from Europe in 1847. It is a native of western Asia; at first it was thought of little value and received little attention, but later it became the subject of many experiments at the different Experimental Stations, and by private parties, both in the north and south. It was not long before its real value was determined, and now it has been cultivated for more than 15 years, and is being more and more used. Ten years ago it was not heard of in our community, and five years ago I only know of one or two other sowing it besides myself, and this year I know one party that sold a car load of seed in my immediate neighborhood. I have been growing it five years, and from the

greatly improved condition of the soil I am convinced it is of the greatest value as a cover crop and soil rejuvinator. My first experiment with it was on a high, sandy hill, where the sand blew badly, and where I found it difficult to get other cover crops to grow. I planted it about the middle of August; it did not make a large growth that fall—still, enough to hold the sand. It lived through the winter and came out in fine condition in the spring. By the time we were ready to turn it under there was a covering on the ground that was really something to see. After it was ploughed under, the soil spoke for itself, the color being several shades darker. We had set this piece of land with peach trees that spring before we plowed the vetch under. The trees made a splendid growth and were in fine condition until we had a very heavy frost in October, which killed many of the young trees; this was in the fall of 1906. The young trees that lived are now four years old and are in fine condition. I have been growing vetch every year on this same place. We have grown tomatoes and melons between the young peach trees and they have always been a profitable crop, except when injured by the dry weather. I always sow vetch seed when the melons and tomatoes are cultivated for the last time. We do this also on orchard and vineyard lands. When we planted melons and tomatoes on land where vetch had been plowed under, we found they did much better than on lands where we only fertilized with sheep and barn yard manures. I have found the greatest benefit in my grapes; where vetch has grown the vines made a larger growth and produced more fruit—also of a finer and better quality.

I believe that vetch is like all other leguminous crops, it grows better after the land has become inoculated. Every spring it makes an enormous growth, many of the vines being from seven to ten feet in length; it is a sight, and can be a terrible trial if you are deloyed in plowing it under. I wish I could give you some idea of the amount of green manure vetch will make, and am safe in saying many tons. My entire farm is covered with it this winter, and it never looked better. I have raised vetch where old trees are growing, and the trees are always much benefitted; the foliage becomes darker and the trees make a fine growth; others adjoining these (where no cover crop was grown) proved to me the value of vetch beyond a doubt.

A piece of land that had lain idle for a number of years and which I had been advised to leave undisturbed as it was of no apparent value, had been covered with a coarse grass, bitter sweet vines, weeds, etc. I cleared up the piece and sowed it to vetch, which grew beautifully, and now I have young peach trees growing there that are doing finely. The first season the vetch made growth enough that I pastured the cow on it during the fall months without seeming to injure the crop in the least.

The United States Department of Agriculture Bulletin No. 147 recommends planting vetch with winter wheat or rye if it is to be used for a forage crop. It also says vetch can be cut up and used for hay, afterward plowing under the stubble, claiming that this will be worth as much to the soil as plowing under the entire crop.

I think this statement can hardly be true, as the green crop turned under must be of greater value in adding humus to the soil.

The Department of Agriculture recommends sowing from one to one and one-half bushels of vetch seed per acre, but I find 40 lbs. a great plenty and 30 lbs. if sown with wheat or rye. The seed is expensive, selling from seven to eight cents per lb. and weighs about 60 lbs. to the bushel. The seed is very hard and a little smaller than sweet pea, which it resembles. It can be planted deep, which is a decided advantage over clover as it does not kill out in case of dry weather. I have always sown the seed broadcast, and cultivated or disked it in. Vetch re-seeds itself, and the seed may lie dormant in the ground for several seasons before springing into life again, for this reason it is not advisable to rotate vetch on grain lands.

I am indebted to a friend for the following information which bears witness to what vetch can do.

On the 17th of May, 1905, he measured a square yard each of vetch,—mammoth, medium, and crimson clover,—he dug, cleaned, and weighed each sample with the following result: the vetch weighed 12 lbs; mammoth clover 11 lbs.; medium clover 10 lbs.; and crimson clover 7 lbs. He sent these samples to the Michigan State Agricultural College for analysis, of which the following table shows the result:

		Green weight. Lbs.	Dry weight. Lbs.
1 square yard vetch weighed 12 lbs., ...	4,840 sq. yds. to an acre.	58,080	8,073
1 square yard mammoth clover weighed 11 lbs.,.		53,240	6,287
1 square yard medium clover weighed 10 lbs.,...		48,400	5,900
1 square yard crimson clover weighed 7 lbs., ...		33,880	1,446.68

	Dry Weight. Lbs.	Ash. Lbs.	Nitrogen. Lbs.	Phosphoric Acid. Lbs.	Potash. Lbs.
Vetch, ...	8.073	1,208.5	357.64	86.38	108.18
Mammoth clover, ...	6,287	1,073.8	177.81	49.67	73.57
Medium clover, ...	5.900	.....	148.04	27.75	59.59
Crimson clover, ...	1,446.68	265.77	31.6	5.21	15.33

The Department of Agriculture of Washington states that a crop of vetch plowed under is worth $16.00 to $45.00 of commercial fertilizer per acre. Of course it does not have the immediate effect of a fertilizer, but its fertilizing properties are felt for the entire season and much longer.

It seems to me, all things considered, there is nothing the fruit growers can better invest his money in than vetch, and I believe it will play a great part in rejuvenating our orchards and vineyards and bringing them into greater productiveness.

Mr. Roberts.—You talk about nitrogen; how much comes from the ground, and how much from the air?

Mr. Smythe.—We are told that it all comes from the air. How is it, Prof. Stewart?

Prof. Stewart.—I would not want to say how much, but it is a mistake to say that the legume plant gets it all from the air. It depends upon the amount put into the soil with the plant; if there is a large amount in the soil, a small amount will come from the air. It will absorb what is in the soil, and then take it from the air. See Dr. Penny's Delaware Bulletin on Crimson Clover. It all depends upon the percentage in the soil.

Mr. Roberts.—I did not mean to contradict the gentleman, but I wanted to bring out just that point. I might say, too, that in the sandy soil of New Jersey, vetch will grow where Crimson Clover will not.

Mr. Smythe.—I find it grows better year after year, so it shows that I am putting nitrogen into the soil, as well as taking it out. I think I am getting to the point, now, where I will have to use phosphoric acid.

Prof. Surface.—I would like to know whether this is the same as hairy vetch or winter vetch?

Mr. Smythe.—Yes, sir; it is the same. The spring vetch is not good for anything.

Prof. Surface.—Does it not become a weed?

Mr. Smythe.—Yes, it becomes a weed in grain land, but not in fruit land, which is cultivated.

Prof. Surface.—But doesn't it get in under the fences where it isn't cultivated, and become a weed in that way?

Mr. Smythe.—We have no fences in Michigan, and we try to keep the land thoroughly cultivated. I would not advise its use where there is no cultivation and there is any danger of its becoming a weed.

Mr. Fenstermaker.—Is it an annual or a perennial?

Mr. Smythe.—An annual.

A Member.—What amount of seed do you use per acre?

Mr. Smythe.—New land forty pounds; where it has been sown before, thirty pounds.

Prof. Surface.—When do you sow?

Mr. Smythe.—After the last cultivation. This year we had to keep up cultivation later on account of the drouth, so it was not sown until August; usually it is sown earlier.

Prof. Surface.—Do you sow before the cultivator, and then cultivate in?

Mr. Smythe.—Yes; we disk in our vetch, and then cultivate it and harrow it.

A Member.—Where do you get your seed?

Mr. Smythe.—From Chicago—the Vaughn Seed Co.; they also have a branch house in New York. I suppose any of the large seed houses handle it. This year we got our seed for about six cents; by the time it reached us it cost us about six and three-quarter cents.

A Member.—Would it not have gathered more nitrogen if you had put phosphorous on the land?

Mr. Smythe.—How about it, Prof. Stewart?

Prof. Stewart.—It would have, if put on in limited quantities. If you have a sufficient amount of nitrogen to maintain the growth of the plant, it would not do any good.

Now, I would like to call attention to one point here. You will notice that the nitrogen is much more in the case of vetch than in crimson clover. That is very surprising to me, particularly on a sandy soil, but I think it is readily accounted for by the difference in growth. You see there is a growth of six times as much vetch on that acre as there is of crimson clover, and there was more than six times as much nitrogen. There does not seem to have been a very heavy growth of crimson clover.

Mr. Smythe.—Crimson clover does not do so well on our soil as on your heavier soils farther south.

Prof. Stewart.—We are using it to some extent on the heavier soils in the northern part of the State, but in the southern part, on the light soils, I like crimson clover best.

Another thing: in growing vetch in an orchard, it is a very interesting fact to me that vetch is a better preserver of moisture than anything else, and the good production of the orchard is undoubtedly due to two things—to the moisture which the vetch conserves, and to the nitrogen it produces. I think I would decide to use vetch wherever possible. What do you say, Mr. Roberts?

Mr. Roberts.—I would do the same thing; only we have a lighter sand than you have, and must take that into consideration.

Mr. McSparran.—I would say that we think a great deal of crimson clover in the southern part of Pennsylvania. We have ten or twelve acres of it, and get about three tons of hay per acre. I mix the vetch and the crimson clover, and turn it into a silo to feed my cows. In this way I get the advantage of the crops, and also the advantage of the nitrogen in the soil. Vetch, crimson clover, cow peas and soy beans grow luxuriously after they are innoculated. Legumes that grow nodules do not grow well until after they are innoculated, but once innoculated, they add to the value of

the soil, and if used as a forage crop, as found by the Experiment Station, it adds to the feeding value at least 50 per cent.

In regard to vetch growing as a weed, we have no trouble in that respect.

Mr. Case.—I would like to say that a number of years ago the Experiment Station at Geneva carried on quite a series of experiments on my place, with hairy vetch, medium clover, mammoth clover, crimson clover and cow peas, and it was found that for the southern shore of Lake Ontario where I am, there was nothing equal to mammoth clover. We were not especially pleased with the vetch. The mammoth clover grows very well with us, and I am not sure but that I am getting into the same position as our friend from Michigan, and must skip a year. I have had my soil analyzed and Prof. Hedrick thinks I have too much nitrogen in the soil, and it will produce too much heavy growth. I have four apple orchards, and Dr. Hedrick claimed I must not sow any more clover in them, in order to get color on my fruit. We sowed the clover about the 15th of June, and mowed it about the 20th of July and again the 1st of October. When we used oats, we proceeded the same way. The third orchard we sowed about the 1st of August, and mowed it about the 1st of October. The fourth orchard we sowed in oats, and mowed it about the 1st of October, and had much the best results. The orchard in which we got the best results of the four was the one that was sowed with clover on the 15th of June, and mowed the 20th of July, and then the 1st of October. We claim there is no cast iron rule in orcharding; we must each adapt ourselves to conditions as we find them.

Prof. Watts.—I want to say a word in connection with Mr. Case's remarks. It is a well-known fact that vetch and crimson clover succeed best in a light soil. Mammoth clover makes a heavier growth than red clover, and I think it should be used more extensively than either red clover or crimson clover. I know it from my own experience in Cambria County. Then why not use mammoth clover more extensively in the northern part of the State?

Mr. McSparran.—Is there any one here who has had any experience in growing sweet clover? I know that in Ohio it grows along the streets as weeds. I have seen it in the streets, along the wayside, for miles alongside our railroads and trolley lines, growing up to six or seven inches. This clover is identical with alfalfa, and if any one here has had any experience with it, I should like to know it.

Mr. Case.—The roadside along the lake shore is covered with it, but we have never used it as a forage crop.

Mr. McSparran.—It is almost equal in feeding value to alfalfa. The cattle do not like it at first, but they acquire a taste for it, and thrive on it.

Prof. Surface.—It will grow on the roughest kind of soil, where nothing else will grow,—a very economical point in its favor. As

it grows up before it goes to seed, it can easily be prevented from becoming a weed; it is a biennial plant, and takes one year to grow, and another to seed.

The President.—We will now take up the next number—a talk on "Recent Developments in a Chemical Study of Lime-Sulphur Wash," by Prof. H. A. Surface.

Prof. Surface spoke as follows:

RECENT DEVELOPMENTS IN A CHEMICAL STUDY OF LIME-SULPHUR WASH.

By Prof. H. A. Surface.

Mr. President, Ladies and Gentlemen: While I have an opportunity, I just want to say a word in regard to the demonstration orchards, which we propose to establish in all parts of Pennsylvania.

Mr. Herr, in the report of the General Fruit Committee, yesterday, says we have received more than thirteen hundred invitations, and we have arranged a plan whereby we can accept all of them. Those that are not taken as public meeting orchards, will be taken as orchards under our supervision. We will take four or five in each county as model orchards in regard to control of insect pests, pruning, culture, etc., the time and places of meetings will be duly advertised, and all information in regard to our plan will soon be given out.

Now I just want to say a word in regard to a clipping which Mr. Fenstermaker handed me to-day, regarding a case of poison from spraying with Paris green for the cabbage worm. I had a case reported to me last summer of a supposed case of arsenical poison from grapes sprayed in this manner. It went through all the papers, particularly in the South-eastern section of the State. If such a thing is true, it is very important that we, as horticulturists, shall know it; if it is not true, we should also know it. I got a sample of these grapes and had them analyzed by Dr. Frear, the State Experiment Station's chemist. He found that these people were not poisoned by the grapes. When such reports get into the papers, it is very important to us that we trace them and disprove them. It is my opinion that there is no such danger from any arsenical poisoning, but I do not want to express an opinion until we have obtained the proper chemical knowledge.

I should have preferred to entitle my talk "Some New Facts," or "Some Facts That Have Recently Been Developed in the Lime-sulphur Wash." I am not a chemist, but I have had a special chemist working on the subject in my office. I am gratified to know that Prof. Stewart is working so well along the same line. Dr. Van Slyke, of the State of New York, and Prof. Parrott, of the Experiment Station at Geneva, are all working along the same line, and reaching the same conclusions.

We stand at the beginning of a new era in regard to spraying, because of certain facts that are becoming established. These are:

First: Color of the lime-sulphur. Most of the facts are already in print in the November Bulletin from our office, but this has not yet been mailed, having been delayed through some error on the part of the State Printer. The copies have just been received at our office, and will at once be sent out.

Briefly, we conducted a series of experiments, making one solution of calcium oxide, a pure grade of lime, without magnesium in it. We had a double strength solution. In another there was about 31 per cent. of magnesium oxide—about one-third magnesia, and in it we obtained the red color of the liquid as in the former. Then we made another solution, in which iron was used with the lime, and that also had the red color, but in the sediment we had a different color. This was dark muddy green. Then we made another solution, in which manganese was used. In that also we had a red color of the liquid, and a dark color of the sediment, and we came to the conclusion that color can be no criterion as to the length of time of boiling. The liquid will always be a wine red. If you mix the manganese or iron with the lime that way, you will produce a dark olive green. If there is no union, it will still be red. So the color cannot be depended on to indicate the length of time of boiling. It does not depend upon the calcium oxide, notwithstanding what has been published in bulletins heretofore. I said in a bulletin some time ago that magnesium oxide would give it the dark color. That is not true; it is the iron or magnesia that gives it the dark color. The dark colored materials, which give it the dark color, are contained in the sediment, which is of no value to the spray material. The real value is in this red colored material.

The second point is the crystallization of the lime-sulphur wash. The home-made boiled lime-sulphur wash which is regarded as standard, consists of:

17 pounds sulphur,
22 pounds lime,
50 gallons water.

The exact proportion is not so necessary, but the more lime you have, and the more water you have, and more you form of a low sulphide, known as the oxide and the common sulphides. If you can keep that out, you form the poly sulphides.

Prof. Cordley, of Oregon, who has been experimenting along the same line as Prof. Stewart, writes in the "American Agriculturist" for January, 1908, for the first, that it is now possible to produce the lime-sulphur solution at home in concentrated and storable form. I recommend:

Sulphur, 125 pounds,
Lime, 60 pounds,
Water, 50 gallons.

At the conclusion of the boiling, it is to be up to 50 gallons. If some boils away, add more, and, as Prof. Stewart says, boil until the sulphur dissolves, which is 45 to 55 minutes. Flowers of sulphur will dissolve a little more quickly than flour of sulphur, but finely ground brimstone is all right. You can dilute this mixture 1-9 and spray it on, and it will be as effective as the old formula 17-22-50. When I make a positive assertion, like this, without any

qualification about it, there is no guess work about it. I am speaking of what I actually know.

Some of you know Eli Cocklin, one of the great horticulturists of the State of Pennsylvania, and the originator of the "Ida" cherry. His son came to my office a few weeks ago with a sample of this concentrate made by boiling with steam, which we had tested in the most approved way, and which gave us 33 degrees Baume. Our 17-22-50 formula cannot stand condensed without cyrstallizing like the concentrate. It does not have to be boiled with 50 gallons of water, but can be diluted to 50 gallons after boiling.

The 17-22-50 must be diluted to one-third if you want to keep it. If you want to keep it concentrated you can make it in solution, such as Prof. Stewart advocates. It is low sulphides in the solution which crystallize. To make it storable we must reduce the amount of water and lime in which it is boiled.

Third: Amount of lime needed, and composition of lime. Twice as much sulphur as lime can well be used. We made some investigations running as high as 15 per cent. or more, of magnesium oxide, and got a solution which was not only as strong chemically, but which stood the hydrometer test as well. You can get just as strong a lime-sulphur solution from a lime that has some magnesium or sodium in it, as you can from a pure quality of lime. If you have any sediment left after boiling it must be strained out.

Air-slacked lime, if air-slacked quite recently, is all right; but if of long slaking it will not do. If you wish to slack it for horticultural purposes, slack it immediately and keep water over it. One good friend in New Jersey uses it in this way, in a barrel standing down in the ground in a swamp, so the water stands always over it. He dips out three times as much of the lime paste as of the fresh burned lime.

The next point is, the need of a hydrometer. The time has come to test for specific gravity, and to do this a hydrometer is necessary. You will understand that the hydrometer will tell you only the strength of the materials. If sugar, or salt, or alum, is added, the hydrometer will not tell that. It can only give the specific gravity. You can have a chemical analysis made to find the presence of any other substance, or you can have the manufacturer give his guarantee that there is nothing but lime and sulphur in it.

The Secretary.—What point is there in putting salt in?

Prof. Surface.—It will add to the specific gravity, and make it look like a more efficient lime and sulphur. You take "Horicum," which is lime, sulphur and salt. The salt makes it look clearer, but adds to the specific gravity.

The Commercial Lime-Sulphur Solutions.

I need hardly tell you that all lime-sulphur is not of the same grade. One firm will make one grade, and another, another grade. You cannot tell whether it is efficient or not by looking at it. Only

the test will show that. We have analyzed the different brands of lime-sulphur wash, and taken their specific gravity; compared with the home-boiled, the amount of dilution would be as follows:

The 17-22-50 has about 14 pounds of sulphur with a 50 gallon barrel of the dilute material. The commercial brands generally recommend 1-11, 1-10, 1-9, 1-8, but we find from the analyses that those samples the following brands which we have analyzed should be diluted as I give them:

Snavely's Brand,	1-4
Lion Brand,	1-6
Niagara (clear),	1-7
Niagara (dark),	1-7
Niagara, later sample,	1-10
Orchard Brand,	1-8 plus
Rex Brand,	1-10
Snow's Brand,	1-6
Grasselli's,	1-9
Scaline,	1-10
Cocklin's Scale-clean,	1-10
Sherwin-Williams,	1-10

Now, there is a new material on the market called "Never Scale." It is in the form of a powder, to be boiled five minutes in water. We boiled it in the proportion of one-half pound to one gallon; we found this would not do, so we boiled it, three-quarters of a pound to the gallon, which gave us about the strength the home-boiled formula does, so the point is that "Never Scale" would be efficient as a scale-cide if boiled three-quarters of a pound to a gallon of water.

The Effects of Carbonic Acid Gas on Lime-Sulphur.

I feel that I should say something about the effect of carbonic acid gas on the lime-sulphur spray. We made a number of tests with it, and found that the sulphur in the solution was precipitated by the action of the gas, and as the sulphur was thrown down as a free sulphur, it became less efficient as a spray. We had 90 pounds of pressure in the first experiment, and the material was warm. We had the home-boiled, 17-22-25 and found that 37 per cent. of the sulphur was lost in the first five minutes; at the end of the next five minutes 43 per cent. had been lost, and at the end of the third five minutes, 53 per cent. had been thrown out. The next experiment, we had the cold, 17-22-50 standard, without sediment, and with agitation, and pressure of 90 pounds per square inch. At the end of the first five minutes we lost less than 1 per cent.; the next five minutes, 1 per cent.; at the end of twenty-five minutes 8 per cent., and at the end of 40 minutes, 20 per cent. We tried again with a solution with a sediment, and kept it agitated. At the end of the first five minutes we had lost 14 per cent.; at the end of the second five minutes, 16 per cent., and at the end of thirty minutes,

19 per cent. This showed conclusively that carbonic acid gas had a deleterious effect upon it.

I know where there have been some (only a very few) terrific failures with the lime-sulphur wash; some were due to the character of the spray (being too dilute), and some of them to the faulty method of applying (not thorough); some of them to the carbonic acid gas spraying machine.

Mr. Walton.—Isn't that rather hard on the fellows that have the carbonic gas machine?

Prof. Surface.—That is the reason why I think I should tell the truth. I can give you the names of men near Harrisburg, whom you know, whose failures are due to that very thing.

With the Bordeaux mixture we had no evil effects; only with the lime-sulphur wash.

Mr. Walton.—You are recommending now the use of the Bordeaux mixture instead of the lime-sulphur spray?

Prof. Surface.—No, I don't think so; I don't want to interfere with Prof. Stewart. We are working out the same principle along different lines—he as a horticulturist, and I as an entomologist.

Now, as to the effect of arsenate of lead added to the lime-sulphur. If you mix this and let it stand for seventeen hours, it precipitates, so as to form a lead and sulphur compound, which cannot yet be recommended. It weakens the lime-sulphur, and you are also using a stomach poison, consisting of lead sulphide. Whether the lead sulphide can take the place of the lead arsenate, remains yet to be seen. It did not appear to. The same change occurred as when we added the lead arsenate to the lime. It prevented the chemical action. Then we tried two other forms—arsenate sulphide and arsenate of antimony. They had no effect on the solution.

The need of a marker. This material (diluted lime-sulphur from the concentrate), sprayed on the trees will leave no mark, and a man going round the tree cannot tell where it has been applied. You can add a whitewash and apply it, just as soon as and easily as this alone is applied. If you add lime to your solution and let it stand many hours you will run down the strength of your solution.

Use of the sediment. It is not necessary to throw away this sediment. I have used it very successfully with a paint brush for peach tree borer (applied about June 15), and also for pear and apple tree borers, and to keep mice and rabbits away from the trees in winter time.

Mr. Fenstermaker.—How do you keep it?

Prof. Surface.—Put it in a barrel and keep it wet; and then add water and use it like whitewash. Take a hoe and loosen the ground around the tree and apply this sediment.

A Member.—What time of the year do you apply it?

Prof. Surface.—From the middle to the latter part of June, just before the peach tree borer lays its eggs.

A Member.—You have to apply it every year?

Prof. Surface.—Yes, sir; by using a short extension rod and small spray pump you need not change your position to reach around the tree. It is a good thing for the peach tree, and if there is any borer, it will kill him without injuring the tree. I have made about a hundred experiments of this kind with peach trees.

What to do with the lime-sulphur mixture. Use the liquid according to the hydrometer test. After you have boiled the crystals an hour and a half they will dissolve. Boiling longer than is necessary is bad, because it forms a low sulphide (reverted) which is not so efficient in killing the pests. Long boiling is at the expense of the beneficial higher sulphides.

You are going to be able to make your own concentrated lime and sulphur now. Go home and make it now, and put it in a barrel, and next spring when you want to use it, dilute it to 1-9. Add lime as a marker, and then follow with a retouching spray. You can have three barrels taken away to a steam engine and boiled at one time, and then have thirty barrels strong enough to kill the San Jose scale, and over a hundred barrels for the fungus diseases.

A Member.—If you open a barrel and do not use all of it, will it spoil?

Prof. Surface.—No; a little film will form over it. Run it through a spigot, and then run it through a strainer, thirty meshes per square inch, so that if it forms crystals, it will be easy to eliminate them. Mr. John Cocklin says he can make this for nine dollars a barrel, and allow a dollar for the barrel when it is returned to him, and it is a strong solution.

The problem is now solved. I don't say this to injure any other brand on the market. It is all right to buy it if you have the assurance that it is all lime and sulphur, and if you use the hydrometer test before you apply it, but this self-made concentrated solution can be made and kept on hand.

Mr. Leighton.—Did you ever spray for the oyster shell scale?

Prof. Surface.—Yes, sir; one pound of good, strong whale oil soap in four gallons of water, applied about the 15th or 20th of May in this locality. It must be done at the right time. The oyster scale all hatch at one time. They are not like the San Jose Scale, which hatches one brood after another, but not all at once.

Mr. Leighton.—I applied it twice, and it killed all the scale.

A Member.—How large a boiler is needed to boil this with steam?

Prof. Surface.—Twelve H. P. pressure will boil eight barrels at one time.

A Member.—A number of people have heaters in their cellars; could they use them?

Prof. Surface.—The amount of pressure is not so important as to get it to a boil. If they have enough pressure to send boiling steam through it, they can boil it all right, and they can also boil it in open kettles or over furnace fires.

A Member.—When you have enough steam pressure to boil the water is it necessary to have more than that?

Prof. Surface.—I don't know that it is necessary, but I do know that twelve H. P. will boil eight barrels at one time. I have not tried boiling it at a low pressure.

Mr. Eldon.—What does it cost to boil it?

Prof. Surface.—I don't know. Mr. Cocklin says he can make money boiling it at nine dollars a barrel. I can tell you what it will cost, as nearly as I can figure it out. What will sulphur cost you?

Mr. Eldon.—$1.80 for flour of sulphur. Of course, there is a difference in grades.

Prof. Surface.—I figure it out at $4.65. That makes from nine to ten barrels. Every man can figure out for himself what his material will cost him.*

Mr. Fenstermaker.—One question that is not quite clear to me. Which sulphur shall we use? Prof. Stewart said flour of sulphur—the commercial—which runs about $1.80 per hundred weight; flowers of sulphur runs about $2.60.

The President.—Prof. Stewart, what is your experience?

Prof. Stewart.—I used flour sulphur in all my work. The powdered commercial, however, is entirely satisfactory as I have reason to know from the experience of a certain commercial firm, which has started up since our bulletin was published. This sulphur runs about one-half of one per cent. impurities, making it 99½ per cent. pure.

Now, if I am entitled to make a few remarks—I worked very hard on this matter for more than six months, and my conclusions,

*Prof. Surface writes as we are going to press: "Since the meeting I have learned that it is made just as strong and satisfactory by using merely the finely-ground brimstone or 'ground sulphur,' which sells at only $1.50 per hundred pounds. In fact I have made a good solution with this and ordinary lime, only 85 per cent. calcium oxide."

I think, are backed by as much work as those of any one else. Prof. Surface and I agree on practically everything except the exact formula. This formula which he presents is one which was suggested by Cordley of the Oregon Station about a year and a half ago, but has since been discarded by him, in his article in "Better Fruit," of April, last year. I was acquainted with this formula when I began my work. I don't believe that it should be used in making concentrated lime-sulphur. It has more sulphur and less water than is desirable. 120 pounds of sulphur is all you can be sure that 60 pounds of commercial lime will take up. And if any variation is made from the 1-2-1 formula which I outlined this morning, it should be in the direction of a slight reduction in the relative amount of sulphur rather than in its increase. Cordley, himself, is now using only 110 pounds of sulphur to 60 pounds of lime. That is a very good formula and one that works well, but is not quite so simple as the 1-2-1 formula, and from my data given this morning there are also other reasons for preferring ours. The latter can be put up in any amount, merely noting that the pounds of lime and gallons of final product are the same, with the pounds of sulphur twice as many. It also gives a very satisfactory density, about 1.24, and utilizes the materials, the original lime and sulphur, somewhat better than any formula which calls for a relatively smaller amount of water.

Mr. Walton.—This morning you advocated boiling the material in the kettle, and not turning in the live steam. Prof. Surface says it is all right to turn in the live steam.

Prof. Stewart.—My point this morning was, and my point now is, that it is difficult with live steam to boil anything down. In making the concentrate it seems to me desirable to have the final volume under control and to have it decreasing rather than increasing. You can of course reach 50 gallons at the finish with live steam, by beginning at forty and going up. But I prefer coming down from sixty gallons to going up from forty. You see, if you start with 40 gallons and keep adding water there is a tendency for the material to keep getting less dense all the time instead of more dense. With the 40 gallon start you don't have an abundance of water to take up the sulphur, whereas, in starting at sixty, we are more certain to have the sulphur all taken up and held. That is my belief in the matter.

On the other hand, there is certainly no objection to any one's trying live steam if he wishes, and it is quite possible that after a little experience with it, very satisfactory solutions can be made, especially if one is not too particular about final volumes and densities. If it is used it will be well to remember that the higher pressure your steam has, the higher temperature it is, and the less likely it is to be condensed in the liquid after boiling begins. It will go in as live steam and get out before it is condensed.

Mr. Walton.—The higher pressure of steam, the hotter it is.

A Member.—Now, I want to know, is that so?

Prof. Stewart.—It certainly is. How do you get high pressures with steam except by additional heat?

Mr. Case.—Is it really any hotter, or does it move quicker?

Prof. Stewart.—It is hotter.

A Member.—I would like to know why you begin with forty gallons and get fifty?

Prof. Stewart.—Because to get fifty gallons at the finish in this way where live steam is being condensed at the time, you have to begin with less.

A Member.—Would not the evaporating of the water be equal to the addition of steam?

Prof. Stewart.—I can't answer that with certainty. It may be possible to arrange it so as to accomplish this.

A Member.—Now I have never had experience with boiling sulphur by steam, but I have boiled meat with it, and I have never noticed any material increase of the water with the meat.

Prof. Stewart.—Well, if you can do it that way, that is the way to do it. I am giving you my experience, and I would say, either use bottom heat, or steam jacket, or closed coils, but you can go ahead and use live steam if you wish. I do not think it is quite so good, but it is usually more convenient.

Mr. Eldon.—Can you boil it with a flame?

Prof. Stewart.—Yes; that is the way I have provided for regularly.

Mr. Walton.—Professor, if you had been boiling only with steam, would you change to a kettle?

Prof. Stewart.—No; if you are equipped to boil with steam, I would boil it in that way, making such modifications as I found necessary, and remembering that one can't boil the material down in that way.

Mr. Walton.—I acknowledge that you can't boil down, but we are equipped to boil with steam, and we have steam. It will simply take a few more barrels to hold the material.

Prof. Stewart.—Yes; that's it; that covers the point.

Prof. Surface.—There is another point: those of you who have the old-fashioned outfit for making the standard home-boiled

lime-sulphur can use it, only I would advise a sheet iron flame protector be added. I am certainly ready to recommend Prof. Stewart's formula, although I know another entomologist who has it up to 165 pounds of sulphur to 50 gallons.

The President.—Now that we have discovered that everybody can do exactly as he pleases, we will take up another subject and make room for another speaker. I am pleased to introduce to you Mr. Case, of Sodus, New York, President of the New York Fruit Growers Association, who will talk to us on "Orcharding in Western New York."

ORCHARDING IN WESTERN NEW YORK.

By President B. J. Case.

Mr. President, and members of the Horticultural Society: I did not come here with a set speech; I came here to have a heart to heart talk with you, and to learn what you are doing in the matter of growing fruit in the State of Pennsylvania. My talk will be governed largely by the questions you ask me.

Now I want to tell you how we are situated. As far as I am concerned personally, I am thirty miles east of Rochester, on the southern shore of Lake Ontario, about one mile from the lake. I grow all kinds of fruit trees. I used to grow berries, but have abandoned them of late years. I have now a hundred and sixty-five acres, or something like it, of fruit, 110 acres in full bearing. There are apples, peaches, pears, plums, cherries, grapes, and quinces and we sell them all readily.

There is one thing especially in regard to the Baldwin apple; I fully believe that we can make the Baldwin bear every year. It has been considered strictly biennial.

I believe in proper thinning and practice it with good results—I have just gathered in my sixth crop in succession. I have two orchards one of which was set out by my father in the fall of 1852, and the other in the spring of 1853. These old Baldwin trees—one was set about 33 feet each way and the other Father set 33 by 49½ ft. These trees generally bore from forty to fifty bushels of fruit, all great, big apples. They would bear every other year, with nothing to speak of during the odd year. I don't know whether you would like to know my plans with regard to these orchards or not.

A Member.—Tell us what you did.

Mr. Case.—Well, I am like Prof. Stewart; I must go back and explain a little bit. In the first place, the chemists tell us that the flesh of the apple is ninety-five or ninety-six per cent. water, only a trace of potash and phosphoric acid, and that the seeds of the apple are very high in potash and phosphoric acid, and that the less seeds you have, the less you strain the tree and exhaust the soil. It does not exhaust the soil or strain the tree to pump the water out of the soil to make the apple, but it does exhaust it to draw out the potash and the phosphoric acid to make the seeds. Now, we know that the tree wants a great deal of food during the incubative

period, from April to July, while it is struggling to form these apples, and these seeds, and the buds for the next year. There is a hard strain on the tree at this time, and I claim that while this is going on, there should be a great deal of readily available food for these little rootlets to get hold of, but if you keep up that stimulation after the 1st of July, you will turn the growth into wood growth instead of developing your fruit. That is the point I want to make before going any further.

We did a lot of experimenting during the commencement of our thinning fruit. We started about the latter part of August or beginning of September. That is the season we begin to evaporate apples, and undertook to save the apples that we pulled off. We are probably the largest evaporating section in the world. We have driven all the cider mills out of existence, except possibly just enough to furnish the farmers with vinegar. We started in to save these small apples, but we found we had no success, until we finished our thinning by Aug. 1. We thin our apples to about six inches apart.

Prof. Surface.—Hand-picking?

Mr. Case.—Yes, sir.

A Member.—Drop them on the ground?

Mr. Case.—Yes, sir; and they go to waste. I started out last summer to spend three hundred dollars thinning my apples. I succeeded in spending $160, and didn't get the job done as I wanted it; but there is no doubt that that $160 netted me $1,000. Don't you think so, Mr. Catchpole?

Mr. Catchpole.—Two thousand.

Mr. Case.—No, I don't want to make it so high; but if the other $140 had been spent, it would have made me another thousand. The trouble is that I can't get my help to agree with me. I have an old Holland Dutchman who has been with me for twenty years. I said to him one morning, "I want you to go down and thin those Pound Sweets and those Seek-no-furthers this morning." Next morning I asked him "How did you get along thinning those Pound Sweets?" He said, "If you want to have those apples thinned, you'll have to send some one else to do it." I asked him "Why?" He said, "I just could not do it, when I saw those big Pound Sweets I can't pull them off. You send some one else." "How about the Seek-no-furthers?" He said, "Oh, them little things? I could pick them all right." Now, I can't use a club on my men, so I'll have to go slow until I get them to see things as I do. You can't find any one of my regular help that does not feel as proud of my farm as I do. You ask anything of any one of my men, and he will feel just as much pride in showing you what he has done as the foreman does. Now, that is my trouble in getting these apples thinned, but my foreman has been convinced this last year, and after this I think I'll get good results.

The secret is that you must have plenty of potash and phosphoric acid in the soil.

The Secretary.—When you do thin, how can you see the results?

Mr. Case.—By the size of the apples.

Prof. Watts.—What is the cause of these defective specimens?

Mr. Case.—Well, insects and fungus growths. We are having quite a little trouble from the Tussock Moth. I don't know whether you have any trouble with it down this way or not.

Prof. Surface.—We have not had it this year.

Mr. Case.—Then we have the climbing cut worm, which cuts holes right out of the apple. It is like the coddling moth; we have never yet been able to completely wipe it out. In our section we have lots of people who do not believe in spraying. You know we are an evaporating section, and they shake the apples right down on the ground, although the last few years the tendency has been to hand pick them for evaporating, and the tendency is toward growing better fruit and selling much larger quantities in barrels.

Prof. Watts.—How often do you spray?

Mr. Case.—I usually spray about four times; this last year I did not spray but three times.

Then we have had a great deal of trouble with the Blister Mite, and even the entomologists did not know how to handle it. The Nursery Inspector found the San Jose scale in an orchard just opposite my yard,—well, you can imagine how I felt about it. We immediately set to work, and did such thorough work that a year ago last winter the inspector could not find but one live scale, and last year he could not find even a single one. A year ago last summer we found the Blister Mite was killed in this orchard. It occurred to me that lime and sulphur was a remedy for the Blister Mite. I drew up an estimate of the cost to spray my apples and pears with lime and sulphur. This I took to the horticultural meeting, and found no one there knew anything about it. Afterwards I took it to Rochester to the fruit show, and even the entomologists did not advise lime and sulphur. Neither the entomologist from the Experiment Station, nor the man from Cornell, nor the State Entomologist knew it, nor what to do for it. A little while after that the agent of the Niagara Spray Company sent me a barrel of the mixtrue, and I sprayed six rows with it. You should have seen the results. A blind man could feel the difference and could feel the leaves with his feet on the ground under the unsprayed trees.

Prof. Surface.—What time of the year was that?

Mr. Case.—The 13th and 14th of April, just before the buds open. I think I can safely say that 90 per cent. of the lime and

TIME CARD.

Gotten up and used by Mr. B. J. Case on his New York fruit farm. It was necessary to reduce the size here to accommodate printing space. The card contains a line for each day in the month and as many columns as you need for the crops you grow, and a few extra blank columns for the things you "forgot."

Date.	Hours worked.	Apples.	Peaches.	Pears.	Asparagus.	Raspberries.	Farm Ex.	Cherries.				Total for Day
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3,												
4,												
5,												
6,												
7,												
8,												
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29,												
30,												
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Totals,												

Due ..... for work. Month ..... 19...

Total days ..... at ..... $.....

sulphur sprayed in our section was the direct result of my own efforts, and of the work done on my farm. We start in and put lime and sulphur on the bare wood, and then follow it with the Bordeaux, and then with another spraying in a few days. One of the great troubles with the farmer of to-day is that he does not keep any books. He does not know whether apples pays him, or pears or peaches. This is an arrangement I got up myself. The cards I use are about 8 inches across, and I think about 15 inches long. Here we run down with the days of the month, and I have a little red stamp with which I mark in the Sundays. Then we fill out the men's names, and each man's time for every hour in the day, and every day in the year. For instance, he gets $1.60 a day; he goes down at 16 cents an hour. Suppose he has worked three hours on the plums and four on grapes, and three on apples. Here it is set down and what it amounts to. This gives us his wages. We do the same thing with the horses. Then I have a little file in the office, and this is kept on the desk, open to inspection. Every man is expected to see that his time is kept properly. At the end of the month I don't want to go back to correct anything. It goes to the bookkeeper then. For instance, this man has earned forty dollars; the card shows just what his time has been devoted to. I think these cards cost me about one cent a piece, and you would be surprised to know how often we refer back to them. It enables us to keep a complete record of everything.

A Member.—Will Mr. Case kindly tell us how to stimulate these trees from April to June?

Mr. Case.—By cultivation and by feeding.

A Member.—What fertilizer do you use?

Mr. Case.—Generally cover crops. I don't use very much manure.

A Member.—Would you use it if you had it?

Mr. Case.—Oh, yes; a limited amount; but I don't have it, and would not use manure heavily.

A Member.—Do you use commercial fertilizer?

Mr. Case.—Yes; after experimenting on my soil I have settled down for my soil per acre to 112 pounds sulphate of potash, 200 pounds acid phosphate, and 400 pounds of bone meal.

A Member.—How is the fertilizer applied?

Mr. Case.—I sow it broadcast, just as early in the spring as I can sow it. My land is a little hilly—nothing but what can be worked easily—and when we come up to the top of the hill we dou-

ble the quantity, and down in the hollows we cut it in half, in this way overcoming the effects of washing. The growth of the tree and the growth of the fruit will tell you whether it is properly fed.

Prof. Surface.—How close to the trunk of the tree do you sow this fertilizer?

Mr. Case.—I don't want it very close to the trunk of the tree, and I don't think it makes much difference whether this root over here gets it, or that one over there.

Prof. Stewart.—It depends upon the age of the tree.

Mr. Case.—They are old trees.

Prof. Stewart.—No fertilizer need be within three or four feet of the tree, because the roots are all interlocked.

Mr. Case.—Now, you all understand we are getting our potash from Germany.

Prof. Surface.—Kainit?

Mr. Case.—As I understand it. If I am not right, correct me. I am not a scientific man, only a fruit grower. As I understand it, the Kainit as it comes from the mine is about 35 per cent. *salt;* then by a certain process they produce the muriate, which is only 15 per cent. *salt.* Then there is another process which eliminates all the *salt,* and is called sulphate. Now, any soil is quite retentive or holds moisture readily, and that is the reason I want the sulphate. The reason I generally use 112 pounds to the acre, is that it comes in 224 pound sacks, and it is easy to say to my men to take half a sack of this, and one sack of the rock, and two sacks of the bone, and that is enough for an acre. Then we count the trees and spaces for each acre, and the amount for each. We have become so that we can easily judge it without weighing it. Then we go in with the wagon and distribute it. We drive the team right into the orchard. For instance you take our peach orchard, the trees are 16 ft. apart. We take five rows, I think—I am not sure from memory, and we have three men on each side.

Prof. Surface.—Sow by hand?

Mr. Case.—Yes, by hand; and then we have another team ready so that when one wagon is unloaded, we can go right on. It is no trouble to sow thirty or forty acres a day in this way.

The Secretary.—Do you think it would be cheaper to do it by machine?

Mr. Case.—I don't know; I don't think so.

A Member.—Have you had any experience with basic slag?

Mr. Case.—Yes; I got into trouble last year by what I said about basic slag. I had five tons of it year before last, and the results were not satisfactory. As I understand it, the basic slag comes from Germany, and is the product of their big blast furnaces, and is composed of iron and lime and phosphoric acid. Now, I believe that if you take that slag and put it on soil that is very rich in humus, or on land of alluvial formation, you will get some benefit, but up in our section we have a glacial formation, and I don't think it is very beneficial there. I made this statement last year, and brought the authorities down on me, and I also got a letter from The Coe-Mortimer Co., who are the agents in this country.

A Member.—I want to say that I represent the Coe-Mortimer Co., and I tried all the various fertilizers on the different soils. I used half timothy and clover, and in every case I got the best results with basic slag, regardless of the character of the soil.

Prof. Watts.—Now, what are the results of *salt* in the potash, do you really think it is injurious?

Mr. Case.—Yes; I am convinced that I do not want any salt on my soil. We very seldom suffer from drought if land is well-cultivated.

Prof. Stewart.—May I interrupt just a moment? I believe Mr. Case is right in objecting particularly to the chlorate in salt on the land, judging from the results at the Massachusetts Station. Results there extending over twenty-one years would seem to indicate that the sulphate is much better than the chlorate, and our third year in orchard experiments in this State seems to be bearing it out. That is, our sulphate effects have shown better results than the chlorine as a muriate.

Prof. Watts.—How much more does it cost in the form of a sulphate than as a muriate?

Prof. Stewart.—About six dollars a ton.

A Member.—I wonder whether the salt does not make the heavy clay soil harder rather than the sandier soil?

Prof. Stewart.—I can't tell you that; I am simply giving you the results that we are getting here and in Massachusetts. Their soil there was a heavy clay. Our soils varied quite considerably, but in every instance the sulphate was better.

Mr. Fenstermaker.—What kind of soil?

Prof. Stewart.—All kinds of soil.

A Member.—Light sandy soil?

Prof. Stewart.—Yes.

Mr. Engle.—Do I understand you to say that you would thin down to six inches?

Mr. Case.—Yes, sir.

Mr. Engle.—Do you ever, with the average commercial fertilizer find the same final beneficial results?

Mr. Case.—Yes, sir.

Mr. Engle.—It seems to me that I saw that at the Ohio Experiment Station the beneficial results were not sufficient to warrant it.

Mr. Case.—Perhaps they do not do it properly; we have had to teach the Experiment Stations some things.

Mr. Engle.—Your trouble in regard to getting your men to thin the fruit properly is the same trouble I have always had.

A Member.—How long does it take you to thin them?

Mr. Case.—I don't know, really. It is not the job you think it is. You may strike a tree that is loaded very heavily, and then, again, you may strike one that is not heavily loaded. If I remember correctly, the boys would thin five or six trees each in a day.

Prof. Watts.—How much smaller was the yield on thinned trees than on unthinned?

Mr. Case.—I think it was about the same. We want a strictly No. 1 apple, that will be a credit to us, and leave the tree in condition to give us a nice crop next year.

A Member.—Can't you thin before July?

Mr. Case.—I think you can as far south as this is. We do not thin them until we get through with the June drop, and see what that amounts to; sometimes we don't get that drop until July.

Prof. Surface.—What implements do you use for cultivating?

Mr. Case.—I use a Planett Jr. Orchard Cultivator, and Springtooth Harrow.

Prof. Surface.—Why not a disk harrow?

Mr. Case.—On account of the stones. The stones will hold the disks from going into the ground.

Mr. Engle.—You say you have abandoned small fruits; was that because it was unprofitable, or because the trees crowded them out?

Mr. Case.—The trees grew up and crowded them out.

Prof. Surface.—Did you have them between the trees?

Mr. Case.—Yes.

Prof. Surface.—How long?

Mr. Case.—Only a few years.

Prof. Surface.—When do you begin to cultivate?

Mr. Case.—Early in the spring.

Prof. Surface.—When do you stop?

Mr. Case.—We harrow all season; we plow only once—always before the 15th of May. You can't plow without cutting the hairy fibrous roots that stretch out hunting for something to eat. If you cut them off after May 15th you give the tree such a shock as it does not often get over.

Prof. Surface.—How often do you harrow?

Mr. Case.—Once or twice a week.

Mr. Engle.—After a rain?

Mr. Case.—Yes; never let the ground get hard. Now, as to cultivation, we believe that as between the sod mulch and the cover crops, clover gives better results than anything else. You have to watch your orchard; if it shows a large dark foliage, I give it a set back by seeding. If it shows that the trees are staggering under its crop I delay the seeding later. Usually commence seeding to clover about June 15.

A Member.—What is your system of apple and pear pruning?

Mr. Case.—I really don't know whether I can explain it to you or not. Our trees are all large trees. Now, when I get a new man on my place, I take him out to the orchard, and ask him where is the east—where does the sun rise? He points to the northeast; then I direct his attention to the northwest, and say to him, "Now keep this in your head," and remember that every leaf that the sun does not shine on at some time during the day is no benefit to that tree but actually a detriment. Now, you want to get that tree so pruned that the sun can get through it and shine on every leaf sometime every day." I am not a stickler for details, but I want men and trees that produce results.

I will stop right here. I thank you.

The President.—Mr. Case is to be followed by a peach man. We have a man here who is a very successful grower of peaches, and he will tell us something about them. Mr. Boyer will now talk to us on "Experience with Peaches."

EXPERIENCE WITH PEACHES.

By John F. Boyer, *Middleburg, Pa.*

Mr. Chairman and Members of the State Horticultural Association: I have been a member of this society for twenty-two years and always look forward to this meeting as a great school for the horticulturist because here I always meet the best of friends. I am sure I owe much credit to the members of this society for the success I have achieved as a fruit grower, my occupation for the last twenty-six years, having at one time forty-four thousand peach trees in cultivation besides apples, cherries, plums, pears and about ten acres of small fruit. I will endeavor to give briefly my method of peach culture in such a way as my experience dictates, with the understanding that I believe that the peach is the most critical crop man can undertake to produce.

I was never the owner of an ideal peach orchard because I had to own the one that produced crops the proceeds of which paid all the bills and allowed a certain per cent. towards the support of my family. Some growers boast of never having a failure of a crop. I can say that myself but some of the crops were so small that I had to throw my note into bank to get sufficient capital to carry on my business until another crop was marketed.

It is almost necessary for a peach grower to sleep with one eye open in order to keep abreast of modern requirements. Providence is a great factor in all lines of production but man must take a hand in it and assist nature in every possible way. Providential fruit culture is a thing of the past.

What are the requirements of a successful peach culturist today? These are many but chief among all is the man himself. Unless he has an iron constitution so he can stand reverses he will not keep courage enough to make a success of the business. This may explain why the peach belt is travelling from place to place.

Having a suitable man, next of importance is the soil and location. I will now describe my own location and soil. I am located fourteen miles west of Sunbury, Pennsylvania, on a ridge or range or mountains between the Juniata Valley and Middlecreek Valley. These hills are underlaid with bird-eye and black iron ore. Some places this black ore crops out, this is known as iron stone or iron stone gravel.

These hills have an elevation of from about eight to twelve hundred feet above sea level. This gives us a splendid air drainage for the production of all kinds of fruit and peaches grow to perfection in this soil if proper treatment is given them. I always try and buy the best trees I can secure and prefer a stocky three to four foot tree.

I plow the ground in the fall, or early spring will do; prepare the ground as for a crop of corn and furrow out the desired distance the trees are to be set, which with me is from fifteen to sixteen feet apart each way, depending on the slope of the ground.

I might say here that I do not grow my peaches on trees I grow them on bushes. I never in all my twenty-six years experience

owned or used a step ladder to pick peaches. We are too busy when fruit is ripe to fool with step ladders.

Having the ground ready to set the trees I take them from the box, with the inspection certificate on the outside and the trees and frequently the yellows and San Jose scale on the inside. The holes are dug deep enough to admit the trees to be planted about two inches deeper than they stood in the nursery. The holes should also be large enough to admit placing the roots in their natural position after all broken and bruised parts are cut out.

After the trees are set the branched top is cut away and leaves only a cane from eight to twelve inches high being governed somewhat by the set of buds which nature has put there to form the top.

Potatoes are grown the two first seasons, after that clean and thorough cultivation is given the trees as long as I consider the orchard profitable. I am frequently asked the question what crop could profitably be grown in a peach orchard after the third year, and the only answer I know to that question is, "A peach crop."

Each spring about one-half of the previous year's growth is cut away. Judgment must be exercised, however, so a well-balanced spreading top is secured. Always bear in mind that the peach tree is unlike the apple, it has no fruit spurs but bears its fruit on the previous year's growth; this annual pruning keeps a succession of new wood. The idea of stopping cultivation about the first of July is all a dream. I keep the cultivators going as long as it does not brush off too many peaches. I generally have a crop just as heavy as the other fellow has.

Enemies to peach trees are almost numberless and the only safe way to get rid of the borers is to dig them out and break their necks. The disease among peach trees known as the yellows proves even worse than the scale. The only remedy I know to hold this disease in check is to dig the diseased trees out and burn them as soon as discovered. San Jose scale: this pest can now be held in check by spraying although spraying is still an experiment to a very great extent. How glad we can be that lime and sulphur has been discovered, as before this was known we were told by the theorists that the only way to get rid of scale was to buy tents something similar to that of Barnum and Bailey's and fumigate with gas.

During the winter of 1904 I had the opportunity to visit the peach belt down in Georgia, and while I looked over thousands of acres in peach trees around Fort Valley I was very much surprised. I found there the growers with the small acreage were really making the most money while some of the largest growers were the owners of orchards that did not pay. Before I went there I had an idea the "big fish" would eat the "little" but after that visit I felt sure the "little fish" would eat the "big one."

I notice our worthy President and Secretary are appealing to the fruit growers of Pennsylvania. Let us as members of this Association appreciate their extra efforts and become more active, not just here in the meeting. Is it possible that a State like Pennsylvania with all her resources must have so few members in the State Association. Travel north, south, east or west, over and

through the State and you will find the best of markets. Thousands upon thousands of people depend upon the products of our Pennsylvania farms. Only a glance at the markets will reveal the fact that two-thirds of the products are shipped in from other states, all of which, except tropical products, could and should be produced in our own State. Eyes and ears have we but it seems to me sometimes that we hear not neither do we see.

Well we Americans are a funny class of people anyhow. It seems to me sometimes that we are pretty much like sheep; where one goes we all want to go. You can all recollect the time we Americans all wanted to go to Klondyke to dig gold, then came the German hare craze, then the Angora goat, then crimson clover, then ginseng, now alfalfa, and the price is way up on skunk hides. Next we will all want to grow skunks.

Knowing the requirements of a successful fruit grower as I do, Mr. Chairman, I fully realize that it is a waste of time to go into detail about peach culture to a class of men so bright and well informed as these here assembled. I further believe these men who compose the State Horticultural Association are the class of men who kept up an inspiration by demonstrating through their respective community to those who surround them and I further believe that were it not for these men Pennsylvania would have lost her fruit interests commercially before now.

A Member.—When trees are headed as low as you recommend, is it not difficult to get the borers out?

Mr. Boyer.—We don't let many of the borers get in, so there is no trouble to get them out.

The President.—How do you keep them out?

Mr. Boyer.—Oh, well, the foliage and the branches; they don't get in as bad as when trees are headed higher.

A Member.—But you have to go over them and examine them every year do you not?

Mr. Boyer.—Oh, yes; we do that.

A Member.—Do you plant northern or southern trees?

Mr. Boyer.—Both.

A Member.—Do you prefer the northern trees?

Mr. Boyer.—Not necessarily; the southern tree that stands outside is better than the northern tree that is kept in the cellar.

The President.—Do you plant in the fall?

Mr. Boyer.—No; the peach is only half hardy.

The President.—Another case where we can all do as we please; I plant in the fall, and always have good luck.

A Member.—How far apart are your trees?

Mr. Boyer.—About 16 ft., except on the steep hillsides, where I plant them 14 ft. apart.

A Member.—How do you get your peaches out of the orchard?

Mr. Boyer.—We carry them in baskets to roadways and then haul them out.

A Member.—How do you work these trees that are right down on the ground?

Mr. Boyer.—I don't do it when the branches bend over.

The Secretary.—Have you any special arrangement of the harrow to go under these low branches?

Mr. Boyer.—I use a spring-tooth harrow.

Mr. McSparran.—Don't you use any special arrangement?

Mr. Boyer.—No, sir.

Mr. Fox.—I wish to say that Mr. Boyer is one of the most successful fruit growers in the State of Pennsylvania. In 1878, being then one of the General Fruit Committee, I asked him for a report, and he not only sent it, but sent some fine fruit for exhibition.

A Member.—I would like to ask Mr. Boyer the names of the five or six best varieties that would stand our severe freezing up here.

Mr. Boyer.—What is the altitude?

A Member.—Less than a thousand feet.

Mr. Boyer.—In order of ripening, Mountain Rose, Crawford's Early, Stump, Old Mixon Free, Champion, Fox Seedling, Beer Smock, Common Smock and Salway.

Mr. Engle.—Why did you not mention the Elberta? If you were planting a thousand trees in a commercial orchard, would you not plant more Elbertas than anything else?

Mr. Boyer.—Well, yes; I planted a good many Ben Davis apple trees, and a good many Gregg raspberries; the Elberta is among peaches what the Ben Davis is among apples.

A Member.—Do you plant the Belle of Georgia?

Mr. Boyer.—No.

A Member.—Would you plant Salway here?

Mr. Boyer.—Not at an altitude of a thousand feet. Here I would use Smock.

A Member.—Ever try Crosby?

Mr. Boyer.—I did at first. They are a very high quality of fruit.

A Member.—How about the Rare-ripe?

Mr. Boyer.—Very good quality, but too shy.

A Member.—Chair's Choice?

Mr. Boyer.—A fine bearer; I had it for about ten years and had a fine crop.

Prof. Surface.—Is not the Crawford Early subject to rot?

Mr. Boyer.—Well, yes; it is sometimes, but it is a good grade of peach, and comes in nice and early.

Mr. Roberts.—Ever try the Waddell?

Mr. Boyer.—I have a few of them in bearing. When I started in twenty-six years ago, I tried too many varieties, and the result was, it did not pay me at all. I soon realized that, in buying, it was the early bird that caught the worm, and, also, that it was the early bird that was caught so I was careful in buying peaches, and I can always speak out of experience; that is all I know of peach culture. I was the first one that started in to grow peaches in our country, and while about ten or twelve years after I started, there were from ten to twelve thousand peach trees in cultivation, I don't think there are so many now.

Mr. Engle.—Of course, you don't recommend the Reeves?

Mr. Boyer.—No; I don't recommend it.

A Member.—Triumph?

Mr. Boyer.—I would not take a thousand Triumph trees for a gift.

A Member.—While we are on the subject, I want to say that I feel like taking up for the Elberta, in spite of what the gentleman

has said against it. I think that most of the prejudice is due to its being picked too early. If I could ripen them all thoroughly, I would grow nothing else.

Prof. Surface.—I feel very much like seconding that motion. I have been very much interested in attending horticultural meetings, and hearing the Elberta likened to the Ben Davis apple. I think it is a good bearer, and a good seller, and I don't think it is right to compare it with the Ben Davis apple.

A Member.—The Elberta made me more money than any other peach, and I had a good many.

Prof. Watts.—That is true of the Ben Davis apple.

Mr. Boyer.—There is no mistake about its being a good seller; it is a good, firm peach, coarse and sour, and it cans very nicely, but when it comes to quality, try some of the Stump the World, or Old Mixon Free, or Fox Seedling, and you will see that the Elberta does not compare with them.

A Member.—Well, the Elberta is certainly bringing in the dollars with me.

Mr. Boyer.—Oh, it is a good selling peach, and I am planting heavily of them, and also of the Ben Davis apple, just as I said, because they sell well. They have a good, firm flesh, but they are coarse.

Mr. Herr.—It is just the same with peaches as the anti-prohibitionist said of whiskey—all brands are good, only some are better than others.

Mr. Engle.—Just one word in reference to the Elberta; it is probably more largely grown in the south than any other peach, but it is picked before it is fully ripe and left to ripen enroute, but if you will let it ripen thoroughly on the tree, I don't think you will have any occasion to discount the peach on account of its quality. It is not up to the Susquehanna or the Crosby, but take it all in all, it is a pretty good peach.

The President.—I agree with you perfectly.

A Member.—I find it is better for the Elberta, and every other peach, to let them ripen on the tree.

Mr. Walton.—Mr. President, don't you think the reason the Elberta sells is because the public knows the Elberta's name. You take any other good peach and stamp it as Elberta, and the public will not distinguish between them.

The President.—Well, not exactly; I am in the local market, and I agree with the gentleman regarding the ripening. You let

it get fully ripe on the tree, and then pick it in the afternoon, and put it in your customers' hands in the morning, and you will find that they like it. Some of them know the difference. I have had them ask me "when are your Globe peaches coming in? I want to wait for them before I can any."

Mr. Walton.—They are educated; but the general public has heard so much of the Elberta without knowing what it really is.

Prof. Watts.—Nobody has said anything about the Elberta for home use; do you keep it for your own table?

The President.—We do, a great many times, for canning.

Mr. Engle.—They sell too well to keep them for home use.

Prof. Watts.—You don't keep them if you can get any others.

Mr. Boyer.—I am growing Elbertas, and I am sure we did not can any for the last eight or nine years.

The President.—Your taste requires a white peach; I see that from the names you have given; the market requires a yellow peach.

Mr. Fox.—Ninety per cent. of the peaches grown in Georgia are Elbertas—I would like to know how often the President gets a crop of Globe peaches—about once in five years?

The President.—It is one of the most productive peaches I have. I am now going to adjourn this meeting until seven-thirty, when we will have a little further discussion of this peach question.

Adjourned.

WEDNESDAY, FEBRUARY 12, 1910, 7.30 P. M.

President Hiester in the Chair.

The President.—The meeting will please come to order. The first number on the program this evening is a lecture on the "Life History and Habits of the Brown Tail Moth," by J. S. Briggs, of Norristown, Pa. This lecture will be illustrated. I have the pleasure of introducing to you Mr. Briggs.

LIFE HABITS AND HISTORY OF THE BROWN TAIL MOTH.

By J. S. Briggs.

The habits and life history of this insect should be well-known throughout Europe, for for a period of one hundred years, laws have been in operation relative to its suppression. Articles concern-

ing it have appeared in the papers and other publications of that country for nearly two hundred years.

Through international commerce, we are exposed, so to speak, to the introduction of many of the pests of foreign countries. For example, the Hessian Fly, San Jose Scale, and the Coddling Moth are now in our midst through this means, and, under our climatic conditions, multiply rapidly, and are inflicting great damage to our agricultural products. The Cotton Boll Weevil is another pest which came to us in our southern borders in 1894, and, from latest statistics, twenty millions of dollars are spent every year to keep it under control. I am frequently asked concerning the San Jose Scale, "When are we likely to accomplish its extermination?" and my answer has been "Never!" The word "extermination" is too strong a term to use in such cases. Extermination is impossible; we must be satisfied to control it; and so with other similar pests.

Our great trouble has been that these pests get into our country unnoticed, and are not discovered until some damage is done by them, and our attention is called to them. This has been the experience in each of the cases mentioned, and, I presume, why I am permitted to talk about this much-dreaded Brown Tail Moth at this time is to help us to a better knowledge of its external appearance in its different phases of life; to be able to recognize it, and to know how to destroy it.

May I here state that our Prof. Surface, with forethought, and with knowledge of our experience in the past, wisely concluded that one ounce of prevention was much better than a pound of cure, and gave the alarm about a year ago. From the February Bulletin of 1909, allow me to quote his words: "At the present time we are facing more grave danger of the introduction of the most destructive and objectionable pest in Pennsylvania than we have ever before experienced. It appears that the Brown Tail Moth, which is so destructive in Europe, and against which laws have been operative for nearly one hundred years, has suddenly occurred in immense numbers on nursery stock, rose bushes, and other plants sent from Europe to America. Our State law is adequate to take care of this just as far as legal provision can be made, but knowledge of the subject by all persons interested is necessary for that co-operation that is essential to secure proper results in preventing loss by these pests.

"After they are once introduced into this State, it will cost several times as much to exterminate them as to keep them out." (He will pardon me, I hope, for suggesting the word "control" instead of "exterminate.")

Immediately following this statement, the call was made for a number of men in his employ to proceed at once to inspect consignments of foreign goods which had reached our borders. This inspection captured (I think this is the right word to use in this case) current report says, about one hundred nests of Brown Tail Moths. Pardon me for mentioning the work of a department of which I am a member. I, personally, deserve no credit for any of this work. It was a case of "Betty and I killed the bear." I was not around when these moths were captured. It is due the department, how-

ever, that the public should know it, and it is also due the public that they should know what is being done for their good.

It was during the spring of 1897 that certain residents of Summerville and Cambridge, Massachusetts, discovered a strange caterpillar upon the unfolded leaves of their pear trees, and, upon closer investigation and inquiry, it was determined by Messrs Fernwald and Kirkland, reliable entomologists of that State, that the new enemy was that of a well-known species of Europe.

Still further investigation followed, and the fact became settled that this moth had been in Massachusetts since 1890, and from that time had been spreading slowly into unoccupied territory.

From the summer of 1897 to the autumn of 1899, quite a vigorous effort was made to repel the spread of this insect. The State appropriation had been limited to $6,000, and at the end of this time became exhausted. For five years nothing was done to prevent its spread, save that of the work done by the individual property holders. During this latter period it spread into all of the New England States save Connecticut. In this State it was not found at this time. Dr. Kirkland tells us that during the first three years of this latter period it added about six hundred square miles of territory, in which it did much damage.

The eggs are described as being about 1-30 of an inch in diameter and hatch in from fifteen to twenty days. In form they are more or less globular, and of a light yellow color. The masses of eggs are about two-thirds of an inch long and about a quarter of an inch wide, and are laid on the under side of the leaves about the middle of July in this latitude. The masses themselves are rather brown in color, and are covered with hair and many of them contain three hundred eggs.

The full grown caterpillar is about two inches long and of a reddish brown color, with a broken white stripe in each side, and with two red dots on the back, near the end. It is covered with tubercles bearing long barbed hairs. The tubercles along the back and sides are covered with short brown hairs in addition to the larger ones. These give the tubercles, when magnified, an appearance like velvet. The head of the caterpillar is pale brown with darker spots.

The very young caterpillar is of a very dark color, with reddish brown hairs, and the head is jet black; on the middle line of the ninth and tenth segments is an orange or reddish tubercle, which may be withdrawn into the body. After the second spring moulting, the brown tufts on the back become less prominent, and the white broken line becomes more noticeable, giving the appearance of the full grown caterpillar.

The full grown caterpillar or larva spins a cocoon of gray silk which is so thin that the caterpillar can be seen through it, and within this cocoon it is transformed into the pupa. It is about five-eights of an inch long, dark brown in color, with a conical spine at the end of the abdomen, bearing a cluster of minute hooks at the end. Smooth, yellowish brown hairs are found scattered over the abdomen, and in the top of the thorax. The cocoons are usually spun at the tips of the branches, and sometimes a dozen or more

larvae will spin a common web, within which each individual forms its own and transforms to a pupa. The cocoons are sometimes found under fences, and under cornices of houses.

The adult, or moth, is pure white, the end of the abdomen being slightly brown, and at the tip of the abdomen, more conspicuously that of the female, is a tuft of brown hair, almost globular in form, whence the name. There can be no mistake as to the identity, since it is the only insect in this country to which the description I have given applies. You will observe that the female is a little larger than the male.

The brown tail moth feeds upon all kinds of foliage: that of fruit trees as well as that of the ornamental shrubbery and forest trees, and as a dangerous and destructive insect is among the first in rank.

They begin to look for the moth in Massachusetts about the 1st of July in each year. (We hope we shall iot need to look for them in Pennsylvania, expecting to find them). As twilight approaches, they begin to fly. Their number gradually increases each hour, until at midnight, they seem fairly to swarm.

The moths seem to be attracted by the light, for they are seen in great numbers near electric lights at night, and it is at this time, and at this period in life that they spread so rapidly. The prevailing winds had much to do with their spread into the States of Maine, New Hampshire and Vermont. They have been discovered on the sides of vessels at sea, and on railway trains coming from infested districts. They are also carried from infested districts, in the caterpillar stage, on one's clothing, and ordinary road conveyances. Within a few days after they begin to fly they deposit their eggs upon the under side of the leaves. About a month later, the eggs are hatched, and the young caterpillars begin to feed upon the upper side of the leaf, first upon the one bearing the egg mass, and later reach out to the other leaves, but return at night to the leaf from which they were hatched. When first hatched they are about one-tenth of an inch long. They shed their first skin within a week from the time they were hatched, and are then about one-fifth of an inch long. Late in autumn, and generally within their winter webs, they shed their second skin.

Usually in September they begin to spin their winter webs, drawing a number of leaves together with a silk. In each of these many pass the winter. These nests are from five to six inches in length, and many times contain more than two hundred caterpillars.

They have a small opening in their webs, through which they pass in and out until cold weather; then the opening is closed, and they remain within during the winter. At this time they are about one-quarter grown.

There can be no mistake as to the identity of these webs. Any web of the character and description mentioned, and found during the winter, containing young caterpillars, is the web of the brown-tail moth. Webs of other insects found during the winter are always empty at that time.

In the spring of the year, as the buds begin to appear upon the fruit trees, the young caterpillars come out from their winter homes.

They have not increased in size during their long fast, and, naturally, they have excellent appetites. It is at this time in their lives that they do so much damage. Buds, blossoms, and later, the foliage, are consumed.

As the caterpillars fill themselves with the buds and leaves in the spring and summer season, so they correspondingly develop and grow and soon reach full size, when they begin to spin their cocoons. This is begun, usually, about the middle of June, and, as I have stated, in these cocoons the transformation to the pupa takes place. In this State they remain for a period of about twenty days, when the cycle of life is complete.

The hairs of the caterpillar of the brown tail moth are finely barbed, and when they come in contact with the human flesh, they reach the pores of the skin, and being quite brittle, sometimes break off, leaving a part under the surface, causing a very unpleasant itching, and in a number of recorded cases, persons have been severely poisoned. It is not necessary that the person himself come in contact with the caterpillar, for at the times when the caterpillar changes his skin, and at the time of the spinning of the cocoon, many of these hairs are loosened, and are carried about by the wind. In the summer of 1906 at North Saugus, Mass., in the parasite laboratory, two of the assistants who were obliged to handle a large number of these wintering nests, were poisoned to such an extent that their hands and arms were swollen to a considerable extent. Their eyes were swollen until they were almost closed, and the irritation of the hairs in the throat and nasal passages, was such as to cause alarm.

Many persons engaged in collecting and removing these nests, suffer from this brown tail rash as it is called, but to a less degree. These sharp brown hairs from the tubercles on the back and sides of the abdomen seem to produce the worse effect, and some of our native caterpillars, carrying similar hairs, also produce this itching effect. A very excellent prescription, which has been offered with good results, is this:

Menthol, ... 10 grains
Oxide of Zinc, ... 2 drams
Lime water, ... 8 oz.
Carbolic acid, ... 10 drops

for external application only.

Unfortunately, the brown tail moth has but few natural enemies; we have come to know, however, that some of our birds assist in checking the spread of this most destructive insect.

The Cuckoo and the Baltimore Oriole do their part in this great work, and the much despised Blue Jay contributes no small share in this service. These feed upon the insect in its caterpillar stage, while many other birds feed upon it in its moth stage.

Dr. Kirkland tells us that at one time, when the moths were emerging in great numbers from the sides of the fences, he observed whole flocks of English Sparrows following after them and devouring them.

Bats and toads come in for a share of this work, as the moths fly about electric lights and fall to the ground.

We wish now to consider some of the remedies for the destruction of this insect. Our best authorities have come to the conclusion that the most effective means of controlling the brown tail moth is the collection and immediate destruction of the winter nests, which are found after the leaves have fallen—we will say from October to April—in about this latitude. Each nest will contain two hundred or more caterpillars, and as we have stated, about one-quarter grown.

In Massachusetts some men make a business of collecting and destroying these nests, and are equipped with long ladders, climbing irons, etc., adapted for that purpose.

After the leaves come out in the spring, the caterpillars leave their nests, and at once commence devouring the foliage, and then our only remedy is to spray with some arsenate preparation, usually arsenate of lead in the proportion of two pounds to fifty gallons of water, when they are young; when they are older, a stronger mixture may be necessary, and we might double the proportion of arsenate of lead when they are fully grown.

One picture shows typical hair covered egg masses of brown tail moth, laid in July, 1899, on trees sprayed May 18th, 1899, with arsenate of lead. So well did the poison adhere to the leaves that the caterpillars died as fast as they were hatched. From a photograph taken at Malden, Mass., Sept. 30, 1899.

You will notice that the spraying was done in May, the eggs laids in July, and the photograph taken in September. And we are told that the work was a success.

Paris Green is sometimes used for this purpose, but it should not be used stronger than one pound to one hundred gallons of water, for fear of burning the foliage.

It is said that in some localities the services of school children have been secured by the payment of a bounty for each nest obtained, and much good has been accomplished in this way.

In Massachusetts they have a law which declares that the Gipsy and Brown Tail Moths are public nuisances, and suppression is required. A superintendent is appointed by the Governor, with the power of appointing agents and assistants in the work of suppressing these moths. Cities and towns, under the advice of this superintendent, are required, under penalty for neglect, to destroy the eggs, pupae and nests of the moths within their limits. In cases of failure to do this, the superintendent shall cause their destruction, and shall assess upon such properties the cost of so doing, to an amount not exceeding one-half of one per cent. of the assessed valuation of such land or properties, provision, however, being made for those who because of age or poverty are unable to pay the expense. To meet this requirement, during the years 1905, 1906 and 1907, the State appropriated $300,000, and for the purpose of experimenting, an additional sum of $10,000 for each of these years, making a total of $330,000 for this period. Any one who resisted, or in any way sought to obstruct the work of an employee lawfully engaged under this law, was subject to a heavy penalty, regardless on whose premises the employee might be at work.

With your permission, I will close by reading an article published in the Philadelphia Public Ledger in July last:

"New England is again at war. Her historic hills are ringing with the sounds of combat, and her verdant valleys are volleying defiance to a common enemy. But 'tis no hated redcoat that is charging the Eastern States in a taxicab to-day; no merciless minion of a plump potentate presents his scarlet uniform for the farmer's boys to pluck. The foe is dressed in brown velvet; he hides in the trees; is numbered in countless millions; is more voracious than the hungriest Hessian ever hired by King George, and the damage he has inflicted since he arrived on our shores is estimated to be ten times as much as all the wreck of fire and flood since the colonies were young.

The Brown Tail Moth is the invader that the farmers and scientific men of New England are battling, and, although the State of Massachusetts has alone spent more than $7,000,000 in the war against him and his terrible brother, the Gypsy Moth, the human forces have thus far met nothing but defeat. Like the Gypsy, the Brown Tail Moth works his havoc in the caterpillar state. Each mother moth lays about three hundred eggs, and each caterpillar converts several hundred leaves into skeletons in the course of a season. Nor are they at all particular what they eat: buds, blossoms and leaves, taste equally good to them."

I thank you.

The President.—Any questions you would like to ask Mr. Briggs? If not we will have a short talk on Peaches, by Mr. Smythe, who will give us some Michigan ideas on Peach Culture.

PEACHES.

By President R. A. Smythe.

Mr. President, Ladies and Gentlemen: When your Secretary requested me to give a short talk on the peach, he did not state what phase of the subject he wished me to discuss. As the subject was so well handled this afternoon by Mr. Boyer, I will not repeat what he so ably said; I will say nothing of pruning, spraying, cultivating, thinning, picking etc. I find it very hard to start peach trees where old peach trees have previously grown, and would not advise resetting in such places until the land has been cultivated for several seasons, and corn crops grown on them.

See that you get good trees. I am sure that much of the failure we have had in recent years in Michigan in starting trees has come from the nursery stock we have been getting; I know of cases where the little trees have developed Yellows the first season after they were set. The disease must have been either in the seed or bud. It is time we were making the nurserymen liable for the stock they are selling. Now, possibly you have in this country good nursery stock, but most all we have at our command comes from the eastern states. At our annual meeting at South Haven we had a discussion about the pit taken from a tree with the Yel-

lows, whether it will produce a tree or not. We have not heard any one say that it will not, but I think the chances are that it will not produce a healthy tree. Like produces like. If you grow your own trees, be sure to have good pits. In Tennessee, where most of the pits are gotten, they have the Yellows worse than any other place in the United States—so I am told.

The selection of buds is just as essential as the seed. If you have a good, vigorous tree, that is the tree from which to take your buds. That is not what a nurseryman does; he takes buds from the nursery row and as these trees are not bearing, he don't know what he is getting.

The "Little Peach" and "Yellows" we have,—I trust you do not have them here. Our Secretary, Mr. Bassett, told your President, Mr. Hiester, that we have eradicated the Little Peach and Yellows, but we have also eradicated the orchards in doing so. I am not satisfied with this, and still hope we will discover some way of overcoming these diseases without destroying our trees. Taking out the diseased trees is the only safe plan to follow.

I am sorry to come to Pennsylvania and learn that the Pennsylvania growers are packing the fruit as badly as we are in Michigan. Out there we find the top and bottom of the barrel all right, but the middle is not up to them. I am sorry to talk about this, but I gave you the credit of not doing this here. In Canada, under the Marks law, they have to pack and grade the fruit, as it is inspected; so it is up to every man to see that his fruit is standard grade; also he has to put his name on the package. I would like to go a little farther in the United States and state the fixed size of the package and make it uniform everywhere. We in Michigan have so many different sizes of bushel baskets,—I don't want to sell a full bushel for the same price that some other man is selling a snide bushel.

I don't think I will say much about our picking and packing. Most of our best fruits are packed in what is known as the "six basket Climax crate," which holds about three-fifths of a bushel. I find we make more money in this way than in any other package until it comes to the canning season. Then the demand is for the bushel.

I was very much interested in the varieties mentioned this afternoon. With most of them I am not familiar, except with the Elberta. This is our standard peach for shipping. The Elberta is a good shipper, but in my opinion, there is nothing quite equal to the Engle Mammoth. I never eat an Elberta when I can get anything else.

As to markets: we have a local market, and a man generally drives into town with his fruit. The buyer comes out, looks at the fruit and says to the man, "What are you offered for your peaches to-day?" The man says, "That is none of your business; what are you willing to pay?" The buyer don't seem able to discriminate, and the man who raises fine fruit gets no more for it than for ordinary fruit. I went out into the market this fall with Concord grapes, which are usually put up in eight pound baskets, and a man asked me "What is your price?" I named it, and he said, "I won't give it." I said, "But there is not a basket here that does not con-

tain eight pounds." He agreed that was true, but it did not make any difference to him whether it held 6 pounds or 8 pounds, and said, "I won't pay any more." So we may pick and pack our fruit all right, but when we get to the market we fall down. We must study the market more. We have to ship to Chicago, and there the commission man takes out his commission, freight and cartage. It does not leave the grower a great deal. I think that where the Hood River people make such a success is by having their own market to depend on, and one man to look after their interests. We tried the packing house system, but is was not satisfactory; too many of the farmers were not honest and most of the fruit that came in had to be handled over again. In one case, out of four hundred bushels that came in, we sent one hundred and eight bushels to the cider mill. The man who was only picking and selling the best could not afford to co-operate with the man who brings in poor stuff. If we had a uniform standard of measure and grade it would be money in our pockets.

I am glad we have the San Jose Scale. It forces out of business the men who did not attend to their orchards, and we are glad of it. Since we are compelled to spray our trees, our orchards are looked after better, and consequently pay us better.

Now, I don't know anything more that I would like to say, except to thank you for your attention. If there are any questions, I shall be pleased to answer them if I can.

A Member.—A tree that grows very rapidly the first two, three or four years, how does that affect the future of that tree?

Mr. Smythe.—I don't know; we are not troubled in that way; our trees are grown rather slow.

A Member.—Do you think a slow growing tree will live longer?

Mr. Smythe.—I think so; some of our oldest trees are those which have been grown on old soil, and made a slow growth.

A Member.—Name three varieties that you consider the hardiest and best in Michigan.

Mr. Smythe.—The Elberta; it is not always a constant bearer —usually two years out of three, it will ordinarily bear, except where thinning is practiced; then it will bear every year. The Engle Mammoth is a very good peach. It is tender-fleshed fruit, but hardy in the bud, and is one of the best bearers. These are both yellow peaches. We don't grow a great many white peaches, except possibly the Lewis Seedling.

Prof. Surface.—Do you do anything to protect the tree against insect and fungus growths?

Mr. Smythe.—Yes, sir; we spray.

Prof. Surface.—What with?

Mr. Smythe.—Lime and sulphur.

Prof. Surface.—Is there any less brown rot on trees that have been sprayed when dormant?

Mr. Smythe.—The brown rot comes at a regular season with us. If we happen to have a humid spell in July, we have more brown rot then, than at any other season. I don't know how you feel about it here in Pennsylvania, but we feel that if we have good air drainage, we have no trouble with the brown rot.

Prof. Surface.—What do you do for curculio?

Mr. Smythe.—We are not troubled with it. I might say that the best peach we have for canning is the Gold Drop.

Mr. Engle.—I thought Hill's Chilly was the best peach grown in Michigan?

Mr. Smythe.—It is not so much grown any more; it is very wooly and not much used.

A Member.—How about the Kalamazoo?

Mr. Smythe.—An excellent variety and is being more set. We don't try to grow a peach that will get into market at the same time the peaches come in from the South. The Lewis Seedling comes in about the time the southern peach is going out. Then comes the St. John, but that is too shy. Then we follow it with something that will keep up a consecutive picking after St. John, then Fitzgerald; then follows the Engle Mammoth and the Elberta, and then the Kalamazoo. Of course, there are a great many other varieties, but these are the ones in general use.

Mr. Engle.—Your Lewis Seedling must be about the same time as our Mountain Rose. I am surprised that you do not raise the white peach.

Mr. Smythe.—The Chicago market does not care for a white peach; we do have the Old Mixen, but it is not a favorite.

Mr. Engle.—I heard a grower say that if he wanted wood and not peaches, he would grow the Old Mixen.

The President.—That was not within the last ten years.

A Member.—You have the New Prolific?

Mr. Smythe.—Yes, sir; it is a very good peach, but I don't think I would grow it if I could grow the Kalamazoo.

Mr. Boyer.—I would like to ask the gentleman why he does not eat the Elberta.

Mr. Smythe.—I don't when I can get the Mammoth. We grow the Elberta for size, but they are great big pumpkins, with very coarse flesh. For our own use we can the Gold Drop. We did can some Elbertas this year for the first time, and my wife says she never knew before that they were so good. Standing in the sugar improves the flavor of them.

Mr. Engle.—Do you grow the Salway or the Smock?

Mr. Smythe.—We grow the Smock, also the Salway. The Smock is a very brittle tree and splits badly.

Prof. Stewart.—The Crosby?

Mr. Smythe.—A very good peach with us, and especially hardy.

Prof. Stewart.—How about the Champion?

Mr. Smythe.—I don't know so much about that.

Prof. Stewart.—Beaucaire No. 3?

Mr. Smythe.—I don't know it.

Prof. Watts.—Do you grow any variety that is hardier than the Crosby?

Mr. Smythe.—The Elberta.

A Member.—The Susquehanna?

Mr. Smythe.—I don't know it; it is not grown there.

Mr. Fox.—How about the Iron Mountain?

Mr. Smythe.—I don't know of it; it may possibly be grown in the northern part of the State. There is a man up there growing peaches very largely. He has some forty kinds, and is trying out many varieties.

Mr. Roberts.—Do you know the Belle of Prussia?

Mr. Smythe.—No.

Prof. Surface.—The Carmen?

Mr. Smythe.—I am not familiar with it, but it is grown in Michigan, but not extensively.

Mr. Knuppenberg.—Do you lose many trees by frost?

Mr. Smythe.—In 1906 we lost 90 per cent. of the trees in our county. We, living along the Lake Shore, were the only ones that saved our trees, but our trees were better sprayed, had good air drainage, and were in a more vigorous condition to stand the cold.

A Member.—Does the Fitzgerald do well?

Mr. Smythe.—Fairly well; it is a fairly good, marketable peach, rather tender. You see we are on the west side of Lake Michigan, only four hours from Chicago by boat, so we can send our fruit pretty ripe, and can ship the more tender varieties.

Mr. Roberts.—How soon do you get your trees into bearing?

Mr. Smythe.—At about four years, but we do not get the best results until they are about seven years old.

Mr. Roberts.—Would you rather have them bear younger?

Mr. Smythe.—No; I think not.

Mr. Eldon.—I heard a gentleman speak of a new peach in Michigan; he said it was white, and had red cheeks.

Mr. Smythe.—And curly hair, and he called it "Marcia." This happened to be Mr. Bassett's little daughter, and she is pretty as a peach.

The President.—We will now have a report on Orchard Experiments by Prof. Stewart.

ORCHARD FERTILIZATION.

Prof. J. P. Stewart, *Department of Experimental Horticulture, State College, Pa.*

The problem of successful orcharding is to secure and maintain a balanced treatment. Many factors are involved,—moisture, plant food, light, protection (from enemies, frost and disease), correct varieties and location, and correct business management. None can be neglected without danger of loss, and it is the weakest factor that limits the crop. The limiters, therefore, must be found and corrected. Money and energy spent on factors already relatively strong are likely to be wasted, while on the other hand, the weak factors will respond to care. Hence, the finding and lifting of limiting factors, coupled with the maintenance thereafter of a balanced orchard treatment, is the correct policy and the keynote to success.

You are already acquainted with the scope and general character of our experiments along this line. But I would recall the facts that we have under experiment in various parts of the state 91 acres of orchard, 49 of which (including 2,219 trees) are in partial or full bearing. The yields from these experimental orchards in 1908 were somewhat over 164,000 pounds of fruit, and in 1909, the third year, they were 256,000 pounds. The data for the tables and conclusions which follow, therefore, cover a period of three years and are derived from something over 420,000 pounds of fruit. The exact locations, soil types and varieties involved are shown in Table I.

TABLE I.

Location, Soil, and Other Data on Experiments Away from the College.

Expt. No.	County	Owner of Orchard	Soil	Varieties	Age 1909	No. of Trees
215	Adams	Tyson Bros.	Porter's Loam	York Imperial and Stayman Winesap	Yr. 10	160
216	Franklin	D. M. Wertz	Mont Alto Fine Sandy Loam*	York Imperial and Jonathan	10	160
220	Bedford	Mrs. S. B. Brown	DeKalb Stony Loam*	York Imperial and Baldwin	11 & 21	160
217	Franklin	J. H. Ledy	Mont Alto Loam*	York Imperial and Gano	16	358
218	Franklin	J. A. Nicodemus	Hagerstown Clay Loam*	York Imperial and Albemarle	10 & 14	400
219	Bedford	J. R. Sleek	DeKalb Shale Loam*	York Imp., Jonathan Ben Davis and Gano	7	320
221	Wyoming	F. H. Fassett	Fine Sandy Loam†	Northern Spy and Baldwin	37	115
336	Chester	A. D. Strode	Chester Loam	Grimes, Smokehouse and Stayman Winesap	7 - 9	120 105‡
337§	Mercer	St. Paul's Orphans' Home	Volusia Silt Loam*	Northern Spy, Baldwin and Rome	2	180&180
338	Lawrence	J. B. Johnston	Volusia Silt Loam*	Baldwin	21	80 & 105
339	Bradford	F. T. Mynard	Upshur Loam*	Baldwin and Fallawater	15	120 & 1

The first three experiments, 215, 216 and 220, comprise what we call our straight fertilizer experiments; the next four are experiments on cultural methods, with and without manures; and the last four are a combination of fertilizer and cultural methods experiments. Each of the fertilizer experiments contains sixteen plots of ten trees each. The treatments are shown in Table II. The symbols N. P and K refer to nitrogen, phosphates and potash; and they are applied at the rates of 50 lb. N., 100 lb. P_2O_5 and 150 lb. K_2O per acre in all cases. Plots 5 and 6 compare the muriate and sulphate as a carrier of potash. Plots 11 and 12 compare acid phosphate and "floats" as a carrier of phosphoric acid (phosphorus pentoxid, more correctly). The manure is applied at the rate of 12 tons per acre and the lime at 1,000 lb. per acre. All applications are made annually.

The combined results to date of the first three experiments are shown in Table II.

*Soils un-mapped as yet, but probably closest to the types indicated according to the observations of C. F. Shaw and H. J. Wilder.

†This soil has received no series name but it is one that has been deposited in a lake bed formed by the temporary stoppage of the Susquehanna in cutting through the mountains.

‡In the two sets of figures in this and the following experiments, the first gives the number of trees under fertilizer treatment, the second those under differing cultural methods. In experiments 339, the latter includes only a sod mulch plot.

§Trees set out in connection with these experiments, hence, not yet in bearing.

TABLE II.

Influence of Fertilizers on Yield, Color and Growth.

Epts. 215, 216, 220.

Plot.	Treatment.	Yields 1908-9. Lb.	Yield Per cent. Benefit.	Yields 1909 Third Yr. Lb.	Yield Per cent. Benefit.	Per ct. of apples colored ½ or more.[1] 1908-9.	Color Per cent. Benefit.	Ave. increase per tree in trunk girth, in inches, 1907-9.	Color Per cent. Benefit.
1	Check	4643	....	1306	....	69.2	....	3.29—	....
2	N P	6887	78.1	1770	51.2	47.9	—22.5	3.54	8.9
3	N K	5653	82.8	1409	36.4	57.	—14.5	3.63	19.1
4	Check	2313	....	897	....	72.7	....	3.18	....
5	P K	3577	62.5	1441	56.5	69.8	1.7	3.34	3.8
6	PK_2SO_4	2773	32.	1664	76.3	67.2	3.6	3.43—	5.1
7	Check	1998	....	1067	....	59.	....	3.29	....
8	N P K	3847	67.4	1561	31.3	41.6	—20.3	3.97—	18.2
9	N	4709	81.2	2675	104.2	43.8	—21.1	4.08	19.4
10	Check	2898	....	1431	....	67.8	....	3.48	....
11	Acid P.	2833	6.26	2126	52.2	69.3	3.3	3.49—	—1.7
12	Raw P.	1548	—36.6	1073	—21.3	75.3	11.	3.29	—8.9
13	Check	2209	....	1327	....	62.5	....	3.68	....
14	Manure	4793	138.3	3423	178.5	56.0	— 9.1	4.30	21.6
15	Lime	1538	—21.7	895	—21.	66.7	— .9	3.73	9.6
16	Check	1843	....	1034	....	70.2	....	3.26	....

Striking things shown here are the strong beneficial effect of manure and of nitrogen on yield and growth, with an accompanying harmful influence on color. Plots 6 and 11 show surprising gains in the yields of the third year. Raw phosphate and lime continue to show deficits in every way except in color for the former and in growth for the latter. We can hardly see any reason for this harmful effect in the case of the "floats" and suspect that it is due to some temporary condition which will disappear later. The same may be true of the lime effect, though the reports of "Lime poisoning" made by Dr. Headdon in Colorado Bulletin 131 are worthy of consideration in this connection. It is also worthy of note that the plots which have made the best yield have also made the best growth, thus showing that reasonable amounts of yield and growth are not antagonistic but rather are associated.

A puzzling condition appears in the fact that wherever nitrogen has been applied in combination with other elements, the benefit decreases in a third year, while in plot 9 where it was applied alone the benefit in the third year increases distinctly. This is partly explainable in the larger yields of the former plots last year, thus bringing them more strongly under the operation of the biennial bearing habit.

[1]In all these tables, the effects on color and size of the fruit were obtained from random samples, taken from the fruit of each tree as it was weighed, the aggregate sample from each plot amounting usually to one or two bushels.

Also the difference in yield between 8 and 9 may be traced directly to a deficit of at least 1,000 lb. that occurred this year in plot 8 of Experiment 220. This deficit was not due to the absence of apples on the trees. On the contrary an excessive number of fruits were started on this plot, despite its heavy crop of last year, and this very fact, coupled with the excessive foliage and extreme drought of the current season, almost prevented development in the apples. Plot 9 of course was subjected to similar conditions, but to a lessened degree in every way. Its original set of fruit and its foliage were less and its moisture situation is hardly as severe as that of plot 8. Thus, while some of the present results are undoubtedly entitled to the rank of "posers," yet they are not entirely beyond partial explanation at least; and at any rate they should not be permitted to cloud the main facts, which are given in the paragraph above.

In Table III we have another set of results from the fertilizer portions of Experiments 336, 338 and 339, which have been running for two years only. The applications are the same as in the experiments above.

TABLE III.

Influence of Fertilizers on Yield and Color.

Expts. 336, 338, 339. (a) Yields in Pounds, 1908-9.

	1 Check	2 N P	3 N K	4 Check	5 P K	6 N P K	7 Check	8 Manure	9 Lime	10 Check
1908, 1st yr.	562	860	748	1118	846	2178	1067	2338	3111	2748
Per cent. Benefit[1],		15.1	-19.8		-23 2	100.9		46.7	42.1	
1909 Totals,	1087	6435	6367	2502	3803	7212	2436	4600	2349	1720
Per cent. Benefit,		312.7	213.6		53.3	193.4		109.7	19.9	
1909.	(b) Color per cent. of apples colored ½ or more.									
Ave. per cent. Color,	57.2	40.-	39.8	49.4	46.5	38.0	49.7	49.0	50.3	54.8
Per cent. Benefit,		-14.6	-12.2		-3.	-11.6		-2.4	-2.8	

In general, these results corroborate those in Table II. The nitgoren plots show remarkable increases in yield; and the ill effects on color are less evident than in the earlier table. The lower benefit on yield in plot 6 is due apparently to the relatively large yield on this plot the first year, coupled with a harmful influence which potash seems to be exerting in this series of experiments. Manure shows itself to be slower in action than nitrogenous commercial fertilizers. The absence of any well-defined effect of fertilizers on the crop of the first year, is evident here as usual. The

[1]The results of the first year were obviously unaffected by the fertilizer treatments, but they are included for the light they throw on some of the results of the second year, notably those in plots 2, 3 and 6.

lime again shows a very weak influence, and the relatively slight benefit that appears is probably due largely to a favorable location in one of the experiments, as explained later.

In Tables II and III we have had results from various combinations of fertilizer elements, as well as some from certain materials used singly. Those results being direct from the trees may be considered a close expression of the values thus far of the various combinations used. In many cases, however, we may wish to know which is the more active element in a given combination and approximately what values are to be assigned to each of the elements in it. For example, in plot 2 of Table II we find a benefit of 78.1 per cent. resulting from an application of nitrogen and phosphate. Here the question arises as to how much of this effect was due to nitrogen and how much to phosphate. Any answer to this can be of course only an approximation of the truth and hence the values obtained and shown in the following table are not to be taken too literally. They are the nearest approach to the correct values, however, that we are able to obtain at this time and they were derived in the manner indicated in the footnote to the table.

TABLE IV.

Influence of Fertilizer Elements on Yield, Color and Growth.[1]

Estimated Per Cent. of Benefit.

Expts. 215, 216, 220.	Yield.		Color.	Growth[2]
	1908-9.	1909	1908-9.	1907-9.
Nitrogen, In Combination, ...	49.2%	15.55%	—19.35%	12.1%
Nitrogen, Alone, ...	81.1	104.2	—21.1	19.4
Ave. Influence of Nitrogen, ..	65.2	59.9	—20.23	15.8—
Phosphate, In Combination, ...	28.9	35.65	— 3.13	— 3.2
Phosphate, Alone, ...	6.2	52.2	3.3	— 1.7
Potash, In Combination, ...	33.6	20.85	4.85	7.0
Manure, Alone, ...	138.3	178.5	—9.1	21.6
Lime, Alone, ...	—21.7	—21.	— .9	9.6

Expts. 336, 338, 339.	Yield.	Color.
	1909 (2nd year).	1909.
Nitrogen, In Combination, ...	236.5%	—11.9%
Phosphate, In Combination, ...	76.2	— 2.7
Potash, In Combination, ...	— 22.9	— .3
Manure, Alone, ...	109.7	— 2.4
Lime, Alone, ...	19.9	— 2.8

[1]The results here given are calculated or taken from Tables II and III. For example, the value of nitrogen in combination was obtained by following the formula $\frac{NP+NK-PK}{2}$. In other words, the per cents of benefit obtained in plots two and three were added, from this sum was deducted the per cent of benefit in plot 5, and the remainder, divided by 2, is considered to be the value of nitrogen in the combination. The other values in combination were obtained similarly.

[2]Per cent of increase in trunk girth.

These results, being derived from those in tables II and III, are naturally not materially different, as a whole, but the values of the individual elements stand out more sharply.

Nitrogen and stable manure show striking beneficial effects on both yield and growth and characteristically harmful effects on color. The effect of the manure is greatest in the third year of the first three experiments, while that of the nitrogen is astonishingly great in the second year of the three later experiments.

Phosphates are showing considerable value on yield, especially when used in combination with other materials. Their effect on color and growth is apparently undecided, as 3 per cent. variations from the normal are readily attributable to limitations in our methods of determining values. Potash, in combination, has shown fairly good effects on yield and growth in the first experiments, but has apparently proved rather distinctly harmful in the second three; and considering the results in all six experiments its value in improving color is very questionable.

Lime in the first three experiments shows a distinct deficit in yield, and no advantage in color, but apparently a fair increase in growth. In the other experiments an apparent benefit in yield is shown. This, however, is due to an unusual increase on the lime plot of experiment 339, an increase which was due probably more to a favorable moisture situation this year than to any effect of the lime. It is surely a significant fact that in five out of six places thus far, lime shows either no effect or a distinct deficit in yield.

It will be noted that practically none of the treatments have materially improved color while a number of them have distinctly decreased it. This reduction in color is undoubtedly associated with *delayed maturity* and a *diminished light supply to the fruit,* the latter being due to an increase in the density of foliage following the application of the fertilizers. The value of sunlight in developing redness in apples is scarcely appreciated. In a test conducted during the fall on York Imperial apples it was found that exposure to sunlight after picking increased redness by over 35 per cent, while apples confined in the dark, or exposed to electric light and under identical conditions otherwise, showed practically no increase in redness. *Maturity in sunlight* on the trees is undoubtedly the great influence affecting redness in fruit, and when soil ingredients apparently affect it, their effect is produced indirectly through a modification in the main influence.

Some of the plots as they appeared in the field during the past season are shown in Figures I and II.

Fig. 1. Plots 14 and 13, Expt. 220.

Stable Manure, 3rd yr., 373. 8 bu. per acre. Nothing 3rd yr., 27. 9 bu. per acre.

Fig, 2. Partial view of plots 1 and 2, Expt. 338,

Nothing, 2nd yr., 156. 4 bu. per acre. Nitrogen and phosphate, 2nd yr., 721. 5 bu. per acre.

The variety in Fig. I is York Imperial, and in Figure II it is Baldwin. The results here shown and others are further considered in Table V.

TABLE V.

Financial Value of Fertilization.

Expt. 221, 1909 (3rd Yr.)	Yield Lb.	Bushels Per A.	Value at 50c.	Cost of Fertilizer.	Net Gain per Acre.
Unfertilized, plots 4 and 7,	19448	194.5	$ 97.25	$	$.....
Com. Fertilizer, plots 6 and 9,	47028	470.0	235.00	13.00	124.75
Manure, plots 5 and 8,	48550	485.5	242.75	15.00	130.50
Expt. 220, 1909, (3rd year).					
Unfertilized, plots, 13 and 16,	291	27.9	$ 13.95	$	$.....
Manure, plot 14,	1947	373.8	186.90	15.00	157.95
Expt. 338, 1909, (2nd year).					
Unfertilized, plots 1 and 4,	2607	156.4	$ 78.20	$	$.....
Com. Fertilizer, plots 2 and 3,	12026	721.5	360.75	15.00	267.55

It is to be noted that the net gains are obtained after deducting both the cost of the fertilizer and the value of the unfertilized crop, also the fruit here is valued at 50 cents per bushel, while the actual prices obtained for it varied from 50 cents to $1.25 per bushel; and any increase in the appraisement of the fruit of course will proportionately increase the net gain. It is also to be noted that variations in the factors of tillage, spraying and pruning produced no material effect on the size of the crop, since the treatment of all plots in these respects was uniform.

Such striking results as these of course are not to be expected everywhere. They evidently occurred here because plant food was the crop limiter in these orchards. For any given case this can only be determined by experiment. These orchards are on three diverse soil types. The soil in one case was evidently "run down"; in another case it was in average condition; and in the third the soil condition was apparently above the average. These orchards are from 21 to 37 years of age, and they are the only ones under experiment above 20 years old. Age, however, is not a sure index of the need of plant food, as one of our youngest orchards, a seven-year old, is responding strongly to fertilization, while some older ones have proved unresponsive. The big fact is that when such results as these are obtainable anywhere, it raises a strong suspicion that similar benefits may be obtained in many other orchards. And these results show beyond peradventure that in some orchards apple trees, like other plants, respond strongly and directly to applications of plant food.

Experiments on Cultural Methods.

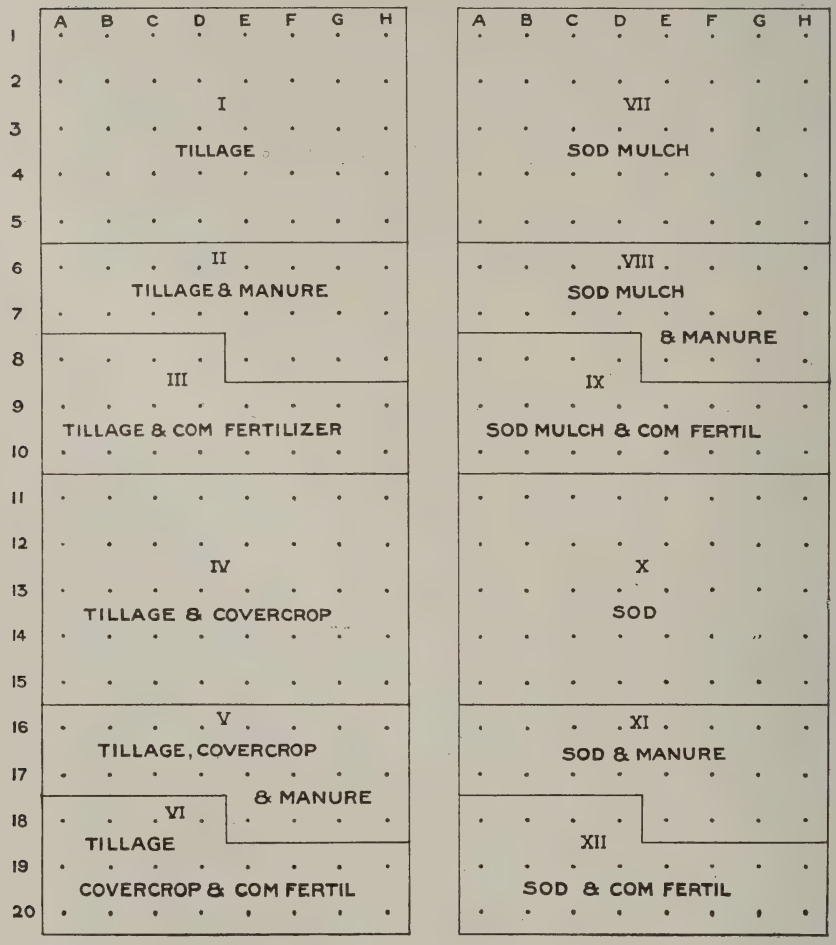
Closely associated with the question of plant-food, is that of soil moisture. It is the available moisture that determines in a large measure whether or not apples shall attain their proper size; and it

is largely to modify moisture supply that the various cultural methods are followed. The plan of our experiments comparing these methods is shown in Figure I.

Plan of Experiment on Cultural Methods and Manures.

As shown in the figure, this experiment tests four methods of soil management, viz.: clean tillage, tillage and cover crop, sod

Figure 2.



mulch, and sod. Each treatment occurs both without fertilization and with it. The stable manure is applied annually at the rate of 12 tons per acre; and the commercial fertilizer at the rate of 30 lb. of nitrogen (N), 60 lb. phosphorus pentoxid (P_2O_5), and 100 lb. of potash (K_2O).

On the mulch plot all herbage remains in the orchard, the first cutting being raked to the trees as a mulch, and an additional mulch

of old straw, swamp hay or buckwheat straw at the rate of about three tons per acre is applied annually. In this latter respect it differs from the so-called "Hitchings plan," and as a conserver of moisture it is undoubtedly very much better than that plan. On the sod plot, the first cutting of herbage is removed from the orchard and the second is left where it falls. The tillage plots are all cultivated until early in July, when those receiving the cover crop are seeded to crimson clover, hairy vetch or medium red clover and alsike, either singly or in combination. The results to date are from the unfertilized plots of the young orchards, and are shown in Table VI. These results and those in later tables on young orchards have been obtained by combining the results from three orchards, whose age as noted in Table I ranges from seven to sixteen years.

TABLE VI.

Effect of Cultural Methods on Yield, Color, Size and Growth, Without Fertilization.

Expts. 217, 218 and 219. Young orchards. (a) Yield.

1907-9.	I. Clean Tillage.	IV. Tillage and Cover Crop.	VII. Sod Mulch.	X. Sod.
Totals, 3 years, ...	15048 lb	16057 lb	17776 lb	13880 lb
Ratios, ...	108.4	115.7	128.1	100.
	100.	106.7	118.1	
		100.	110.7	
1909 (b) Color. Per cent. Apples colored ½ or more.				
Avrage per cent., ...	75.4	81.	81.5	85.6
Ratios, ...	100.	107.4	108.1	113.5
1908-9. (c) Size. Average weight of Apples.				
Average weight, ...	4.5 oz	4.74 oz	4.91 oz	4.69 oz
Ratios, ...	100.	105.3	109.	104.2
		100.	103.6	
1907-9. (d) Growth. Increase in Trunk-girth.				
Average increase, ...	4.38 in	4.14 in	4.29 in	3.58 in
Ratios, ...	122.3	115.6	119.8	100.
		100	103.6	

In these results, the mulch system is first in yield and size of apples, second to sod on color, and second to clean tillage by a slight margin on growth.[1] It has surpassed the cover crop method on every phase and in total ranking is plainly first thus far in the combined results of this group of experiments. Reserving judgment on the relative merits of these systems for the present we will turn to consider the data from a similar experiment in an older orchard,—that of Mr. Fassett, in which the trees are now 37 years old. The results from the unfertilized plots in this orchard are shown in Table VII.

[1]The margin is really slighter than appears in the table, as the 1909 measurements in the mulch plot of experiment 218 were taken a little higher on the trunks than those of 1907, owing to the presence of screens on the trees at the later date.

TABLE VII.

Effect of Cultural Methods on Yield, Color, Size and Growth Without Fertilization.

Expt. 221, Mature Orchard. (a) Yield.

1907-9.	IV. Tillage and Cover Crop.	VII. Sod Mulch.
Totals, 3 years,	34269 lb	23294 lb
Ratios,	147.1	100.
1908-9 (b) Color. Per cent. Apples colored ½ or more.		
Ave. per cent. of color,	57.4 %	87.5 %
Ratios,	100.	152.4
1908-9 (c) Size, average weight of apples.		
Average weight,	4.75 oz	5.04 oz
Ratios,	100.	106.1
1907-9 (d) Growth, Increase in Trunk-girth.		
Average increase,	2.9 in	1.32 in
Ratios,	219.7	100.

From the above results it will be noted that, in the mature orchard, tillage with a cover crop for three years has been far superior to sod mulch in yield and growth, having borne nearly one and a half times as much fruit and showing more than double the increase in growth. In color, the mulched fruit excels by more than 30 per cent.,[1] and in average size of apples it excels by about 6 per cent. This last fact is undoubtedly connected with the smaller crop on the mulched trees.

The results of Tables VI and VII are apparently contradictory. They are all explainable, however, on the bases of soil moisture and age of trees. In the young orchards, with the herbage and three-ton addition of straw, an effective mulch of sufficient extent was maintained, while in the old orchard we were unable thus to cover more than probably half the root area. In the latter case the term *sod* mulch was distinctly appropriate since at least the outer half of the roots was under a typical sod and often in dust-dry condition.

The results in Table VI indicate that, even in trying seasons, such as the last two have been, the moisture in orchard soils may be conserved more effectively by a good mulch than by tillage. This conclusion is corroborated by moisture determinations made by Shutt, of Ottawa, Canada, in 1905 and 1906.[2] He also has found that leguminous plants, particularly those of dense and matted growth like hairy vetch, are much less severe in their drain on soil moisture than the grasses; and that the shade of the growing vetch is a better moisture conserver than the mulch formed by cutting and leaving it in place. In other words, the loss by capillarity and sur-

[1]Really the mulch excels in color by 52.4 per cent, using the amount of color on the cover crop area as a base.

[2]Central Experimental Farm. Report of the Chemist, p. 151, 1906.

face evaporation from the practically bare ground was greater, under the conditions at Ottawa, than the transpiration through the legume.[3]

The cover on our mature orchard is grass only, while on the young orchards a scattering growth of alsike or medium red clover has been maintained in addition.

In further explanation of the difference in effectiveness of the mulch and cover-crop methods in Tables VI and VII, we may call attention to the hastening influence on bearing, which sod undoubtedly exerts under favorable conditions. This was shown in our results of last year,[4] where sod on these same three orchards surpassed clean tillage in yield by 13 per cent. It is also shown here later, especially in the sod-manure plot of Table IX. But the fact that this sod influence can be easily overdone and made to disappear under unfavorable conditions, is clearly shown in our results from the unfertilized sod plots of Table VI.

The next table is introduced to show the effect of adding fertilizers to the four cultural methods. All unfertilized plots are excluded from this table, and the yields given include both the manured and commercially fertilized plots under each method.

TABLE VIII.

Influence of Cultural Method on Yield, With Fertilization.

Expts. 217, 218, 219. Young Orchards.

	2 & 3. Clean Tillage	5 & 6. Tillage and Cover Crop.	8 & 9. Sod Mulch.	11 & 12. Sod.
1908 Yields,	9193 lb	9512 lb	11203 lb	10351 lb
1909 Yields,	14554	12443	12571	12823
Totals,	23747	21955	23774	23174
Ratios,	108.2	100.	108.3	105.6
Expt. 221, Mature Orchard.				
1908 Yields,		6684	10351	
1909 Yields,		28297	22545	
Totals,		34981	32896	
Rations,		106.3	100.	

As compared with Tables VI and VII, these results show a marked leveling effect from addition of fertilizers. In other words, the applications of plant food have tended strongly to reduce or even nullify the differences due to cultural methods. This effect was also very distinct in the appearance of the trees in the field.

A consecutive increase in productiveness following the addition of plant food has been very marked in some cases. For example, the mulched plots of Experiment 221, receiving manure and commercial fertilizer, in 1907 produced 3,050 pounds of fruit; in 1908, as seen in the table, they produced 10,351 pounds; and in 1909, 22,545 pounds. And this occurred on plots receiving no tillage.

[3]Ibid, 1904, p. 158.
[4]Pa. Bul. 91: 15. 1909.

Fertilization for Different Cultural Methods.

The question often arises as to what is the best form of fertilizer to accompany different cultural methods. This question is partially answered by the data in Table IX.

TABLE IX.

Effect of Manures on Yield.

Expts. 217, 218, 219.

Season 1908-9 (2nd & 3rd Yr.)	Unfertilized.	Stable Manure 12 T. per Acre.	Com. Fertilizer, 30-60-100 Lb. per Acre.
Clean tillage,	13698 lb	21605 lb	23022 lb
Tillage and Cover Crop,	14550	20582	20681
Sod Mulch,	15702	23678	20408
Sod,	11706	24772	17929
Totals,	55656	90637	82040
Ratios,	100	162.8	147.4
		110.5	100.
Expt. 221.			
Tillage and Cover Crop,	33119	31924	35502
Sod Mulch,	21091	35396	28370
Totals,	54210	67320	63872
Ratios,	100.	124.3	117.8
		105.4	100.

This table shows the influence of manures[1] on yield when used in connection with different cultural methods. It will be observed that in every case except one, the yields from the fertilized plots have surpassed those from the unfertilized. And in the one exception the yields on the corresponding fertilized plots this past year were more than double the yield on it. In total effect, considering all treatments, the fertilized plots show a nice per cent of increase over the unfertilized; and the stable manure at the rates applied shows a small gain over the commercial.[2]

Examining the data still more closely, we see that in every case on the tilled plots commercial fertilizer has surpassed the manure, while on the untilled plots the reverse is true. In other words, the present data indicates that, from equal values of manure and a proper commercial fertilizer the best results are obtained by using the manure on sod or mulch areas, and reserving the fertilizer for use in connection with tillage. Either material, however, may be used satisfactorily and it is very probable that in any case a more or less regular alternation can be made more successful than any thing else.

[1]The complete commercial fertilizer is here included under the term "manure."

[2]Twelve tons of average stable manure are estimated to contain about 120 pounds each of nitrogen and potash (K_2O), and about 80 pounds of phosphorus pentoxid (P_2O_5). The relative cost per acre, as applied, is about $15 for the manure and $13 for the commercial fertilizer.

TABLE X.

Effect of Manures on Color, Size and Growth.

A. Expts. 217, 218 and 219. (a) Color. Per cent. Apples colored ½ or more.

	Unfertilized.	Stable Manure.	Com. Fertilizer.
Average per cent.,	71.2	61.9	62.4
Per cent. benefit,		—9.3	—8.8
(b) Size. Average weight of apples.			
Average weight, ounces,	4.71	4.99	5.25
Ratios,	100.	106.	111.5
		100.	105.2
(c) Growth. Increase in Trunk-girth.			
Average Increase, inches,	4.12	4.3	4.43
Ratios,	100.	104.1	107.5
		100.	103.
B. Expt. 221. 1908-9. (a) Color. Per cent. Apples colored ½ or more.			
Average, Per cent.,	72.5	68 1	73.5
Per cent. Benefit,		—4.4	1.
(b) Size. Average weight of apples.			
Average weight, ounces,	4.89	5.42	5.33
Ratios,	100.	110.8	109.
(c) Growth. Average Increase in Trunk-girth.			
Average increase, inches,	4.22	5.86	4.92
Ratios,	100.	139	116.6
		119.1	100.

Table X shows the effect of manures in both young and old orchards on color and size of fruit and on growth of trees. The effects have been fairly distinct in all cases,—reducing the color with one exception, and apparently increasing size of fruit and tree-growth.[1] In all cases, the color is least on the plots receiving stable manure. In the old orchard, manure shows some advantage over commercial fertilizer in wood growth and in size of apples, with effects reversed in the young orchards. The greater effect of commercial fertilizer in the young orchards is probably connected with the smaller area over which it is distributed, thus giving relatively stronger applications.

The above data are obtained from extensive work through a short period. In Table XI, we have data from the reverse conditions,—one experiment continued over 21 years.

[1]We say "apparently" increased the size of fruit, since the matter of size is undoubtedly primarily dependent on soil moisture and number of fruits on the tree. Thus any fertilizer effect must necessarily be indirect, as in the case of color.

TABLE XI.

Massachusetts Experiment on Apples, 1889-1910.[1]

Treatments and Total Yields per A., to Date.

Plot.	1	2	3	4	5
Annual Treatment.	Manure, 10 Tons.	Wood Ashes, 1 Ton.	Check.	Bone & K Cl 600 & 200	Bone & Low G. Sulfate. 600 & 400.
Average Girth,	38.25 in.	33.23 in.	27.98 in.	32.27 in.	37.02 in.
Ratios, - - -	136.7	118.8	100	115.3	132.3
Yields, lb., - -	24934	12841	3940	14453	21863
Ratios, - - -	632.8	325.9	100	366.8	554.9
Color and Size.	4	1	5	3	2

These results are similar to those recorded in the preceding tables with the differences in some cases even more distinct. In every respect the treated plots have proved superior to the untreated. Manure leads in yield and growth but falls next to the check in quality. It is closely followed in yield and growth and much surpassed in quality by plot 5, which received ground bone and low grade sulphate of potash. The superiority of 5 over 4, which differs only in the carrier of the potash is very interesting. Whether it is due to the magnesia in the sulphate or to a harmful effect of the chlorine accumulating from the muriate, or to a soil difference, cannot yet be stated. It will be recalled that our results of the third year corroborate it, in plots which compare only sulphate and muriate.

The practical point, however, is that with such differences as these existing, even though unexplained, the safer policy is to apply potash in the sulphate form. The difference in cost is small, and if so desired it can be readily met by a reduction in the amount of potash applied. This would be justified by our present results, which indicate that the usual recommendations of this material for orchard use may be reduced to advantage.

Summary and Practical Suggestions.

From a general view of the results as a whole, we see that there is more than one way of securing good results in orcharding. In other words, there is more than one way of varying the limiters after they are found. For example, we can conserve moisture either with tillage or mulch, or we may secure apparently the same net results by proper fertilization. This gives opportunity for choice and permits the grower within certain bounds to determine his course on the bases of relative expense and practicability.

[1]Data furnished by Dir. Wm. P. Brooks, of the Mass. Expt. Sta., December, 1909.

In most cases and especially in bearing orchards, this choice will result in tillage, either every year or one year in every two or three. The tillage will be supplemented by leguminous or other proper crops, and will receive additions of plant food when needed. But the relative cost of labor, mulching material, and manures, varies with the locality. And where labor is scarce or costly, or the land too sloping or stony for tillage, the grower need not lose heart. But with a good mulch properly supplemented with plant food, he may grow apples equal to the best,—apples in many cases more satisfactory than those of the man who depends entirely on tillage.

When we come to the application of fertilizers, the best test for their need is in actual trial or experiment. The appearance of the trees after all other factors are apparently right, may afford some evidence, as may also soil analyses. But the only sure evidence comes from careful trials, remembering that fertilizers can have little if any effect on the current year's crop.

Pending actual results, if it is desired to use fertilizer, our present general advice is to apply one carrying about 30 lb. nitrogen, 60 lb. phosphorus pentoxid (P_2O_5), and about 50 lb. potash (K_2O) per acre.[1] This should be accompanied by green cover crops or alternated with stable manure, ten tons per acre, at least once in three or four years.

The time of application is important. For soluble and transient materials like nitrate of soda, the best time is when the need is greatest, which is probably immediately after the supply of stored food is exhausted, or some time after petal-fall and before the first of July. The other more permanent material may be applied at the same time, or like stable manure they may be applied in early spring or in late winter.

For either temporary or permanent covers, leguminous plants are best both because of their nitrogen product and their lessened drain on soil moisture, especially the matted and dense growing kinds, such as hairy vetch.

Mr. Roberts.—Is that Massachusetts experiment with a low grade sulphate?

Prof. Stewart.—It is with kainit; it is between low grade and high grade. It has not a large amount of muriate or chlorate.

Prof. Surface.—Was it two hundred or two hundred and fifty pounds ground bone?

Prof. Stewart.—Two hundred and fifty. It will take that to give you sixty pounds of phosphoric acid. As the trees advanced, I cut it down.

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[1]Such amounts could be obtained by mixing either of the following combinations of high grade materials. (A) 100 pounds each of nitrate of soda, dried blood, and sulphate or muriate of potash (former safer); and 250 lbs. steamed bone meal. (B) 100 pounds each of nitrate of soda and sulphate or muriate of potash; 120 pounds dried blood, and 400 pounds acid phosphate.

The President.—At the sugestion of Dr. Hunt, a committee consisting of our Secretary and Mr. Fassett visited these orchards during the last fall, and we would like to have a report from these gentlemen. Mr. C. J. Tyson will please report.

The Secretary.—As most of you are aware, Dr. Hunt came to State College a little over three years ago from Cornell, where he held a professorship in Agronomy, with no special knowledge of, or perhaps interest in, the subject of horticulture. He is a very broad-minded man, however, and soon realized the importance of horticulture in Pennsylvania, and saw what was being done in this State along that line. He had had no opportunity to become acquainted with our requirements, so he came to this Association three years ago this winter, and asked that we designate the course of work that would be most beneficial to us as fruit growers, and requested an outline of some work that the Experiment Station could do for us. The matter at that time was taken up by the apple growers, and the work Prof. Stewart has been carrying on since that time was outlined then. Prof. Stewart has been telling you some of the results this evening. He made a preliminary inspection trip late in the summer. Some marked results were beginning to show. He then went back to State College (I am guessing at some of this) and made a report to Dr. Hunt. Dr. Hunt realized that when some of the things Prof. Stewart had told him, were brought before the Association, they were so unusual that there might be some doubt in the minds of the members. He decided it would be well to have some corroboration, and this committee was appointed to visit a few of the experimental orchards.

We visited three of the orchard experiments, namely those located with Mr. J. B. Johnston, of Lawrence County, Mr. F. H. Fassett, of Wyoming County, and the S. B. Brown Estate, in Bedford County. We made a report of our observations to Dr. Hunt, giving the details of what we saw in each place. There is no need for us to go into these details at this time. I simply wish to say that the things we saw corroborate the things which Prof. Stewart's figures indicate, but figures and words fail to give a clear idea of the striking differences we found between treated and untreated plots.

Much to our surprise, in all cases the application of nitrogen showed decided benefit in the matter of fruit production and the quality of fruit produced, to say nothing of the advantage we expected to find in the greatly improved foliage.

The past treatment of the soil in the fertilizer experiments has not been such as to store up either vegetable matter or fertilizers in any form. From the experimental point of view, however, this has been an advantage, approaching as nearly as possible to ideal conditions. To my mind, just here lies the difference between the results of this experiment and the results of some other similar experiments tried on soil which was already plentifully supplied with nitrogen, and which was kept supplied through the life of the experiment by leguminous cover crops, which were not considered.

We were not able to see any advantage from lime in any of the experiments.

In the report made to Dr. Hunt, I think both of us very earnestly recommended that this work be continued. We feel that this work is along the right lines, and of great importance to the horticultural interests of the State.

The President.—Mr. Fassett, have you anything to add?

Mr. Fassett.—Nothing, except to emphasize what has been said by Prof. Stewart and Mr. Tyson. These things are a revelation to us—this nitrogen in the growing of apples. It is all so new to us, because we have been applying potash to our trees, and these experiments have been conducted on the same varieties of apples we have been growing for years back. It was certainly a high compliment to us to be able to go to see the fruit growers of Pennsylvania, and I think we are exceedingly fortunate in having a man like Dr. Hunt at the head of our Experiment Station, and I hope that these experiments will be carried on for the next ten years under the wise management of the present time.

The President.—I think it would be well for our Committee on Resolutions to commend the work of the Experiment Station in these fertilizer experiments and we trust it will be continued.

A Member.—Is this nitrogen applied to pear orchards, too?

The President.—The experiments have been entirely on the apple. Dr. Hunt's idea was to commence with one thing, and do that well. That is why it was said this afternoon that there would be, in all probability, another man put on this work, and, after a while, a third. In the course of the next few years we will have the whole Experiment Station working for us.

The President.—Any further business? If not, we will stand adjourned until nine o'clock to-morrow morning.

Adjourned.

THURSDAY, JANUARY 13, 1910. 9 A. M.

President Hiester in the Chair.

The President.—Is the Auditing Committee ready to report?

Mr. Fenstermaker.—Mr. President and friends of the Association: We would report that we have examined the accounts and found them correct. We would, however, recommend a change in the manner of keeping the accounts, without, however, reflecting in any way on the Secretary or Treasurer, both of whom we believe to be honest men; we make the recommendation simply to make the work easier. We recommend that all monies received and paid out be handed to the Treasurer. With a proper voucher and check sys-

tem, it will be an easy matter to audit, and also make it easier to keep the accounts.

The President.—What shall be done with this report?

Mr. Eldon.—I move that this report be accepted and the committee discharged.

This motion was properly seconded and carried.

The President.—We have with us Mr. Gould of the Department at Washington. We are very glad to have him with us. I have been a member of this Association for forty years, and do not remember that we have ever had the pleasure of having him with us before. He will talk to us this morning on "Apple Varieties: Old Ones that Are Good, and New Ones that Seem Promising," and the Secretary suggests, on anything else that he has to say to us on this matter of fruit growing. I have the pleasure of introducing Prof. Gould.

APPLE VARIETIES: OLD ONES THAT ARE GOOD AND NEW ONES THAT SEEM PROMISING.

By H. P. Gould, *U. S. Department of Agriculture, Washington, D. C.*

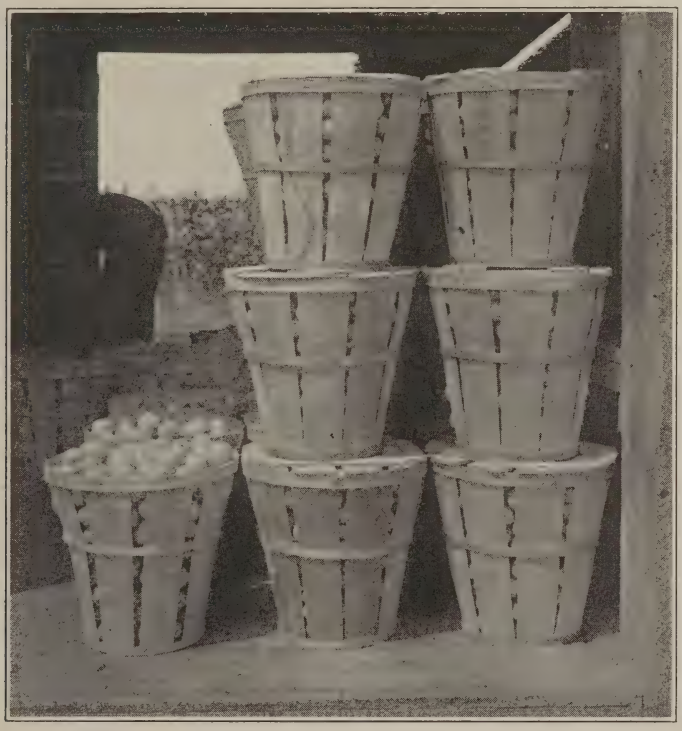
Mr. President and Members of the Pennsylvania State Horticultural Association: It is not without some feeling of embarrassment that I come before you at this time to talk about apple varieties. You have your own variety experts like Dr. Funk, your worthy President, Mr. Hiester and others, beside of whom I feel like a pigmy from the variety standpoint. Furthermore, the great number of varieties which are grown in your state that are doubtless of value and concerning which but very little is known, serves still more to complicate matters. If I am able to say anything that will interest you along the line of my subject,—which by the way was chosen for me—it will be because of the somewhat wide range of conditions under which I have been able to study some of the varieties that I shall mention. If later on, I am permitted to introduce to you some strangers among varieties which give promise of meriting your intimate acquaintance, it will be a pleasure to do so.

The problem of varieties is an old problem and it is a great one. I fancy it will always remain a great one. As long as there are varying conditions under which fruit is grown and as long as there are different tastes to suit and different purposes for which it is desired, the problem will continue to be an unsettled one.

When, in retrospection, we consider the varieties of apples that have contributed to our pomological history, and contrast them with the varieties that we think of to-day as new sorts, we cannot help asking the questions "What real advancement has been made from the variety standpoint?" and "Whither are we bound in the line of varietal progress?"

Surely that apple must have been an enticing thing, which in the Garden of Eden, caused the trouble that has ever since been the heritage of the human race. We would like to know the variety. The good people down in Albemarle County, Virginia, are quite sure it was Yellow Newtown (Albemarle Pippin). And the apples which in ancient days could comfort Solomon in all his wisdom and glory when he was sick of love, and for which he sighed, must indeed have been better eating than Ben Davis—our most abundant market variety.

Before taking up the matter of varieties, I must say a few words about the factors that influence the behavior of varieties as we see them growing in different places.



BUSHEL HAMPERS
A Package much used in Shipping Summer Apples

We often speak of a variety as if it were fixed and invariable, when in reality a variety is largely the product of the conditions under which it is grown—that is, its environment. And as environment is changed, so is the variety changed—sometimes beyond the point of recognition even by the best experts.

In order to give greater significance to what I may say about varieties, I want to mention somewhat briefly the more important factors that make up the environment under ordinary conditions of orchard culture. To say that a variety is good or otherwise in a

particular place means but very little fundamentally, except as such statements are interpreted in terms of environment.

This is not the connection in which to discuss in detail even if I could do it, the conditions that prevail in the different sections of your State but reference to the factors of influence should assist in making the necessary applications in each individual case.

In a rough analysis of environment, the factors of influence fall into two groups—climate and soil. Cultural conditions constitute a most important factor in the case but this is so primarily, because of their relation to and effect upon the soil factor of environment.

Though the climate may effect the roots of our trees, its greatest influence, generally speaking, is on the part above ground. The soil on the other hand is not without its influence on the top, but as generally considered it determines the environment of the roots.

Going still further in reference to the climate, we may say that the climate of any place consists of:

1. Atmospheric pressure.
2. Temperature.
3. Rainfall and snowfall.
4. Time and frequency of frosts.
5. Extremes of heat and cold.
6. Direction and velocity of the wind.
7. Amount of air that flows from the different points of the compass.
8. Amount and intensity of sunshine.
9. Humidity and transparency of the atmosphere.
10. Electrification of the atmosphere.

Without entering upon any discussion of these elements of climate in their relation to fruit growing, the enumeration of them serves to indicate that the climatic influences are exceedingly complex. I feel reasonably certain that a better understanding of them would explain many things that are now seemingly past our comprehension.

The soil factors are also complex in their relationship to fruit growing but, personally, I am much inclined to attach less importance than some do, to the extreme distinctions that are sometimes made regarding soil types and soil influences in relation to fruit growing. In fact, some of the factors that are commonly grouped with soil influences and which are exceedingly important, do not belong with the soil factors at all when rightly considered. For instance, we say a soil is too wet for a fruit soil. We commonly think of this as a soil characteristic and from one standpoint perhaps it is. It is true that soils which differ in their physical condition may and do also differ with regard to their moisture or water content. But generally speaking in the case of a soil that is too wet for fruit growing it is a matter of location or a matter of drainage—not a matter of soil, per se, at all.

Again the amount of humus in a soil will greatly modify its physical condition and consequently its suitability for fruit grow-

ing. But the humus content of soils is very largely a matter of soil management and is not characteristic of one type of soil more than another, except perhaps as conditions of location and past history are such as to produce what is commonly called "muck" or some other type that is composed almost entirely of decaying vegetable matter rather than being made up largely of decomposed rock or other inorganic substances.

Do not misunderstand my position with regard to the importance of soil conditions. I would not minimize the importance of the soil factor in the least. But I would emphasize the relative importance of climatic and cultural conditions. As to the latter, you all know very well how strikingly good cultivation, pruning, fertilizing, spraying, etc., affect the behavior of varieties in contrast to conditions of neglect. But these operations are not factors of environments. Rather they modify or control environments. I need not spend any time on this point.

A word more, however, about the climate is in order. The elements of climate have already been enumerated. These elements as they prevail in any place are modified by several factors that we often overlook. Among them there are:

(a) Topography, both local and continental.
(b) Proximity to large bodies of water.
(c) The latitude of the place.
(d) Its elevation, both actual and relative.

We all know the desirability of a relatively high location for fruit growing. But perhaps it does not often occur to us that a high location is preferable because of the influence of elevation on local climatic conditions.

Just one more word about the soil in order to say that the soil features which I believe is inherently the most important, is one that is commonly very largely overlooked. I refer to the subsoil. In speaking of the condition of the soil, we ordinarily refer to the few inches that the plow turns over and do not go much deeper in our consideration of it. I believe that the condition of the soil or rather the subsoil, three feet or five feet and perhaps even at a greater depth is vastly more important in its relation to fruit growing than the usual surface conditions and the upper subsoil possibly that we are accustomed to talk about and to consider. I feel confident that many of the apparent mysteries that we very often find in fruit growing have their explanation buried in the soil much deeper than our considerations usually take us.

With these cursory remarks about some of the factors that affect the behavior of fruit varieties and determine their adaptability to particular conditions, I turn to the real subject of my paper. It should be remembered, however, that Pennsylvania is a large State and represents a wide range of all the conditions that influence the behavior of varieties. Very few varieties are equally valuable throughout the State. The northern part of the State is in what is sometimes called the Baldwin-Greening-King belt, while the southern part, especially the southeastern portion is in the Ben Davis-York Imperial-Winesap belt.

Old Varieties That Are Good.

Of course in this consideration, we must include the varieties just named, though by the exact terms of my subject, I have no real right to refer to Ben Davis. It is an *old* variety to be sure, but not a *good* one. I know there are many who say that it is their best money-maker. But will you be offended at my frankness if I say that such a claim comes very near being a self-incrimination. Perhaps this variety *does withstand* the conditions of neglect that prevail in some orchards better than many varieties do. Is that why it is relatively the most profitable sort? Sometimes this is undoubtedly the case.

But the situation with regard to Ben Davis is simply this: A brand of any commodity in general use, it matters not what it is, that is of poor quality in comparison with other brands, and is put on the market in large quantity, is a detriment to the trade in that commodity and restricts its use. Ben Davis corresponds to a brand of goods of poor quality that is put on the market in large quantity. I firmly believe it restricts the consumption of apples. The great trouble with whiskey is that it *creates a taste for more*. If it wasn't for this fact there would be no whiskey and no temperance problem. Ben Davis apples *never in the world created a taste* for more apples. On the other hand, when a consumer to whom the name of a variety means nothing—and this is true of the mass of people who are supplied by the retail trade—gets a half-peck or peck of nice looking Ben Davis apples and attempts to eat them, he concludes forthwith that he doesn't care much for apples. And who can blame him? His appetite for apples is satisfied and it's a long time before he orders more. But when a supply of really choice apples is obtained the tendency is for it to be renewed as soon as it is exhausted. In other words, a *taste for more is created* and the consumption of apples is increased thereby. The demand for them is increased likewise. And you come right back to that old law of supply and demand as a price regulator.

In this line of argument I am sure my logic is sound and I do not believe my conclusion can be successfully contested. If this be true, then every barrel of Ben Davis apples that goes into the retail trade is a detriment to the trade because of its influence on the demand for increased supplies of fruit. I speak of Ben Davis as if this was the only offender. It is the chief one because of the relatively large quantities of it that go into the trade but all varieties of poor quality are guilty of the same charge of which I accuse Ben Davis.

Some very discriminating varietal critics say that Baldwin barely escapes this charge and with all due respect to the prejudice which loyal Pennsylvania fruit growers may have in favor of York Imperial because of its place of origin, that variety isn't any too good in quality.

Having now cleared the varietal atmosphere in this way, I can proceed with my subject. Reference to other varieties is made about in the order in which they ripen.

Yellow Transparent.—For a very early sort this has few if any equals. It is grown throughout a remarkably wide range of country, and there are few sorts that are so well adapted to so many different conditions as this one. Its season in this State is probably from the first to the middle of July, depending upon the location. While the tree has some faults, they are not as a rule serious. It bears very young and is sometimes used as a filler. It was formerly considered too tender fleshed for a market variety but experience has demonstrated that when properly handled it is very valuable for commercial purposes.

YELLOW TRANSPARENT

One of the best of Early Summer Apples. Note the heavy load of fruit.

Early Ripe.—This variety closely follows Yellow Transparent and in the early apple growing section of Delaware, it is considered one of the most valuable sorts.

Red Astrachan.—This is another variety that is very widely grown and generally with fair satisfaction. It has some faults and would probably be discarded if there was a good red variety of its season to substitute for it.

Williams. Williams Favorite, Williams Early Red.*—This is a most excellent variety to follow Red Astrachan. In central Delaware its season begins from July 15th to 20th. It is of good size,

*Yearbook U. S. Dept. of Agr. 1908, p. 476.

beautiful in appearance and of fairly good quality. It does well under a wide range of conditions and would probably be valuable for its season in many sections of this State both for market and home use. Some confusion exists in Delaware and New Jersey regarding this variety. Sops-of-Wine, a variety much inferior to it, has in some cases been planted for it under the synonyn, *Williams Early Red.*

Early Cooper.—This is another early variety of much value in some regions. It is frequently found in the orchards of Oklahoma and Kansas as well as in other states. Its importance in some sections of the Middle West together with its good quality, suggests its possible value in some parts of this State.

WILLIAMS' EARLY RED
A very satisfactory Red Apple for early summer

Maiden Blush.—This is a standard for its season which follows Williams in good sequence. In most parts of this State it probably ripens during August. It is widely and extensively grown in many parts of the country.

Gravenstein.—This is a good running mate for Maiden Blush. Possibly it is more easily influenced by its environment than that variety is but where it does well, it is of better dessert quality, and an excellent variety for culinary purposes.

Wealthy.—This is a variety of growing importance. It is of good quality and fine appearance; not over-sensitive to the influence

of conditions, it can be made to fill a place in season and otherwise that is not filled by many other sorts.

* * * * *

There are many other early varieties of much merit which would doubtless prove valuable in some parts of this State, both for home use and for market but time permits reference to them only by name. Some that I would especially mention are: Benoni, Jefferis, Early Joe, Oldenburg, Chenango, Fanny, Red June, Primate and Starr the latter an early apple of growing importance in New Jersey and elsewhere. Other varieties might be named which would perhaps be equally valuable as the above but the list cannot be extended indefinitely.

Passing to the mid-season or fall varieties, there are fewer candidates for favor.

Bonum.—I do not know what this variety would do as far north as this State. In the Piedmont region of Virginia it is a most excellent variety. Highly colored, medium size and of excellent dessert quality. It is a very satisfactory variety in that region for a September trade. For a personal market, a hotel or some other special trade it could not fail to be a "reputation maker." Perhaps it would not be as valuable as far north as Pennsylvania as it is in Virginia.

Mother.—This is an apple of exquisite dessert quality and ought to be planted for home use much more commonly than it is. The tree is rather small but of moderate growth. Probably it is improved by top working on a stronger growing tree such as Northern Spy. I am told it is doing well in Harford County, Maryland. Its high dessert quality commends it for very thorough trial.

Celestia.—While this is an old variety, it is not much grown. Perhaps it is better known in Ohio and some other parts of the Middle West than elsewhere. Its color which is rather greenish and not altogether attractive is against it but its quality is such as to commend it very highly to many growers. For a fall variety, it is worthy of consideration in this State, at least for home orchards.

Smokehouse.—This old variety does credit to your State in which it originated. It is not being grown as extensively as its merits justify, though it is found in many sections from here south to Virginia and occasionally elsewhere. Possibly it does not come into bearing quite as early as some sorts but it is worth waiting for.

Grimes. Grimes Golden.—It is doubtful if this variety would be as valuable in the northern as in the southern part of the State, but in the latter portion it would probably do well. And as an apple of high dessert quality, it has few superiors. Some markets do not take a yellow apple as readily as a red one, so this is perhaps not as widely grown as it would otherwise be. When well-grown, it could hardly fail to prove satisfactory during the fall and early winter for a personal market where the grower comes in direct contact with the consumer. It is generally considered a short-lived tree. Probably the most satisfactory way to grow it is to top-work on some strong growing sort.

Jonathan.—This is a most excellent red "running mate" for Grimes and it is much grown in some of the regions where Grimes

is extensively planted. It probably does not have as wide a range of adaptability as that variety has and might not be generally desirable in this State, yet is worthy of careful consideration. In quality it compares favorably with Grimes and is about the same in season. Its value as a storage apple is not generally recognized. At the Louisiana Purchase Exposition at St. Louis in 1904, cold storage specimens of this variety of the crop of 1903 were displayed in the Missouri exhibit in August of the Exposition year, which were apparently in as perfect condition and as good in quality and flavor as when they were stored.

Only a small number of the longer keeping varieties will be mentioned. I would call attention to the following:

White Pippin.—If this were a red apple it would doubtless be a leading candidate for popular favor. I have recently seen most excellent specimens of it from Maine, from New Jersey and from Missouri. It is apparently doing well in all of these widely separated regions. It is better in quality than most of the more common commercial sorts. The tree is vigorous, fairly productive and by many it is considered a profitable sort. It is a fairly good keeper. Occasionally it is mistaken for Yellow Newtown.

Esopus. Esopus Spitzenburg.—This is one of the varieties that has helped to make Hood River famous. It is grown some in New York and several times I have seen very fine specimens of it from Virginia. While not considered a particularly heavy bearer and more or less subject to scab, its very high dessert quality and its beautiful appearance commend it wherever it can be successfully grown. It is worthy of a thorough trying out in this State. There may be sections here where by good cultural methods it could be made very profitable.

Rome Beauty.—This variety belongs in the Ben Davis-York Imperial-Winesap belt rather than in Baldwin country. It is very popular in some parts of Ohio and it is a candidate for favor in Virginia, though not yet much grown. Delaware produces some grand fruit of this sort; it is also grown some in the northwest, and on the Pacific Coast. While not of the highest quality, it is fairly good. Frequently said to do especially well on sandy soil.

Dickey.—This is another old variety from Ohio that is but very little known. It is of medium size, fairly good color, a good keeper and in dessert quality it is considered by some to be entitled to a higher rating than almost anything in the apple line that ever existed. It originated in Ohio many years ago, but like so many other old varieties of merit, it has never had a sponsor who could talk about it enough to win public favor and general recognition for it.

To stop here with the winter sorts in which you are doubtless all more interested than you are in the earlier varieties, is not to do justice to the long keeping varieties, but time forbids further consideration of them. Besides it would weary you too much. I merely mention by name a few other sorts which because of their high quality or their merit in other particulars should be given consideration as of possible value to Pennsylvania fruit growers. A few such varieties are: Roxbury, Hubbardston, Tolman (Tolman Sweet) Swaar, Westfield, Evening Party, perhaps Winesap in some

D.G. Passmore

DELICIOUS APPLE.

THE SACKETT & WILHELMS CO., N. Y.

localities and I would add Arkansas if it was not generally such a shy bearer, and so on—almost ad infinitum. Not all of these would be desirable, commercially, but I consider them all varieties of merit for one purpose or another, and worthy of consideration by fruit growers in this State.

New Sorts That Seem Promising.

Turning now to some of the newer varieties, I must mention them with only a few comments. In passing I might say that it is difficult in this connection to make any very formal distinction between a variety of merit that has been recently introduced and an old sort of apparent value that has remained in obscurity all its days.

Wilson June.—This variety, though originating in northwest Arkansas 40 or 50 years ago, remained unknown outside of that section until a few years ago when it was propagated by one of the well-known nursery firms of the Middle West and by them extensively advertised. The statement in the catalogue of this nursery company, however, that it is identical with San Jacinto and Mrs. Bryan is surely erroneous. It is a rather rich, sweet or nearly sweet apple of the Red June type in external characteristics, considerably larger, perhaps not quite as early, but of good quality and very attractive in appearance. Worthy of testing generally as an early sweet sort.

Summer Champion.—This is another early sort from northwest Arkansas that early apple growers should keep in mind for trial as it appears to be promising, though but little known.

Florence.—This is likewise a northwest Arkansas variety. I know of but one commercial orchard of it. It is about the same in season as Jonathan. It is a beautiful red apple of fairly good quality but not as choice as Jonathan. The tree, however, is a strong, vigorous grower and does not possess the weakness that Jonathan often shows. So far as I know it is not in cultivation outside the region of its origin. Worthy of being thoroughly tested.

*Magnate.**—This is a seedling that was grown by the late Dr. Stayman of Leavenworth, Kansas, who also produced Stayman Winesap. It is attracting some attention. It is a beautifully colored apple, medium to large in size, about 10 days earlier in season than the Jonathan, though it is said to keep till December. In dessert quality it is rated as very good. It is supposed to be a Winesap seedling and is considered promising in Winesap growing territory.

Rabun.†—This is a chance seedling that was found in northern Georgia about 1890. The fruit is large, beautifully colored, washed with mixed red, splashed and striped with bright crimson. Subacid, good to very good in quality. In northern Georgia, season is November to March. How this variety would behave in Pennsylvania is a question, but worth finding out.

Stayman Winesap.‡—Perhaps this variety has now been known to fruit growers too long to group it with new varieties, still I do

*Yearbook U. S. Department of Agriculture, 1906, p. 355.
†Yearbook U. S. Dept. of Agr., 1906, p. 359.
‡Yearbook U. S. Dept. of Agr., 1902, p. 470.

not believe it is as generally known to fruit growers in middle latitudes as it should be. The tree is a fine grower, and a good bearer and the fruit possesses every quality to make it valuable both for market and home use. While the fruit often lacks color on young trees, this difficulty disappears as a rule as the trees attain a little age. I consider it to be one of the most valuable varieties for middle latitudes of recent introduction and look upon it as one of the sorts most likely to put Ben Davis "on the run."

*Delicious.**—This variety has been too much advertised during the past few years to call for extended comment at this time. It is of too recent introduction, however, for much actual information to be available at the present time relative to its range of adaptability but so far, indications point to its being adapted over a wide range of territory. It is of sufficient promise to warrant a thorough test of it throughout middle latitudes and well into the north. It may join honors with Stayman Winesap in routing Ben Davis and its allies.

King David.—In general the comments about Delicious apply to this variety. In season it is about the same as Jonathan and it admits of comparison with that sort perhaps better than with any other one.

Ensee.†—This is a chance seedling which originated in southern Ohio about 1880, but it is only slightly known outside the region of its origin. It is a productive, regular bearer. Fruit of large size, surface washed with mixed red, splashed and brokenly striped with bright crimson. It is an apple of fine appearance, rich, sub-acid flavor, and very good in quality. In southern Ohio its season is late fall and early winter, keeping well in storage.

Carson.‡—While this is really an old variety, it remains practically unknown to most fruit growers. It is another Ohio variety originating in the northern part of that State. It appears to have a rather unusual record for productiveness and regularity of bearing. It is a beautiful apple of good size and rated "very good" in quality. It keeps until March in northern Ohio. It would appear to be a promising variety for testing especially in the northern part of this State.

Bloomfield.§—This variety first came to notice as a chance seedling in Montgomery County, Maryland. It has been slightly disseminated in Maryland and Virginia but is generally unknown. It is a large smooth apple, yellowish, washed with crimson and striped with darker red. The flesh is tender and juicy, rich sub-acid, good to very good in quality. Its season in the region of its origin is September to November. Its good appearance and high quality together with its other desirable characteristics recommend it for trial in this State.

Some other varieties that are either new or but slightly known and which might be of value to the apple industry of Pennsylvania

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*Yearbook U. S. Dept. of Agr., 1907, p. 305.
†Yearbook U. S. Dept. of Agr., 1907, p. 307.
‡Yearbook U. S. Dept. of Agr., 1905, p. 497.
§Yearbook U. S. Dept. of Agr., 1904, p. 399.

are Coffman, Ingram (a), Doctor (b), Virginia Beauty (c), and Bennett (d). Many others might be mentioned but these are the "cream of the lot" that have come to my attention. There are also many unnamed seedlings of excellent quality that have received more or less notice and which appear to possess a good deal of merit.

Now I have mentioned just a few of the many old varieties that are good and a number of new ones that are promising. Perhaps many of you have in your minds the names of varieties of great value and have been wondering if they would be mentioned in the present connection. Perhaps some of you are saying to yourselves: "How could anybody fail to name this variety or that one?"—some sort which you know possesses particular merit. And you possibly are a bit disappointed because of the omission. I have only to say that this is by no means intended as a complete list of good or promising varieties for your State. I have merely attempted to call to your attention a few varieties which I believe to be of better quality than the bulk of the apples that are marketed and which are valuable in other respects either for commercial purposes or home use, and if as a result of this discussion of varieties, there is developed a desire even on the part of a single individual to test some of these little known sorts of high quality, and that desire is not satisfied until the testing is undertaken, I shall feel as if I had sown a grain of mustard seed which may sometime grow into a good sized tree. I wish every State Horticultural Society in the country could maintain trial orchards in representative sections of the several states for the purpose of testing a large number of varieties of different fruits which are likely to prove valuable in those sections. Within the lifetime of a generation the variety lists would be very greatly changed and improved by such a course.

The Secretary.—How about the Primate?

Prof. Gould.—An excellent apple, but a little tender, and not very much grown for commercial use.

A Member.—Twenty Ounce?

Prof. Gould.—A little later, but an excellent apple for the northern portion of this State; very much grown in New York, and profitably. Whether it would be very satisfactory in the southern portion of the State, where the York Imperial and Winesap do well, I am not so certain.

The Secretary.—Have you left out the Summer Rambo?

Prof. Gould.—I have left it out. I didn't attempt to make a complete list. It is of excellent quality, and widely grown, and

(a) Yearbook U. S. Dept. of Agr., 1901, p. 382.
(b) Yearbook U. S. Dept. of Agr., 1904, p. 400.
(c) Yearbook U. S. Dept. of Agr., 1905 p. 495.
(d) Yearbook U. S. Dept. of Agr., 1908, p. 475.

probably should have been included in a list of this kind. There are few varieties of this sort that are of as high quality.

The Secretary.—Leave the Gravenstein out, and put in the Summer Rambo.

Prof. Gould.—Yes, I know the Gravenstein is not so popular. It is rather more susceptible to conditions favorable or unfavorable.

Mr. Fenstermaker.—The Carolina Red, and the Everbearing Red?

Prof. Gould.—The Everbearing Red I don't know. The Carolina Red originated in North Carolina, and has a whole lot of synonyms that would reach across a page. It is generally called the "Early June," is a good bearer, is of high quality, and can be easily grown in this State.

Prof. Watts.—Grown northward in this State?

Prof. Gould.—I don't know it north of New Jersey, and not very much in that State. In some portions of this State it would probably be all right.

The Secretary.—Is it of good size?

Prof. Gould.—Rather small; that is one difficulty with it as a commercial apple, although some growers find it very profitable. One apple grower in Missouri has quite a number of trees, and I am informed by him that he finds it about as profitable as any variety he can grow, regardless of the season. Throughout North Carolina, where the variety probably originated, and where it has been grown for a great many years, there are a good many different varieties which are closely similar to Red June. In all probability they are seedlings of it, although there is no proof of this. All information regarding their origin is wanting, but there are a number of varieties that are quite popular through that section and I am quite sure that some of them are better than Red June itself.

Prof. Watts.—Where does the Jonathan succeed best—on what kind of soil, and under what kind of climatic conditions?

Prof. Gould.—I don't know that I can tell you where it succeeds *best*, but I can tell you where it succeeds. Through the Mississippi Valley generally, as far north as Central Illinois, it does very well. Through the Ozark region it reaches good size, is magnificent in color, has good keeping quality, and is as satisfactory as any of the varieties grown there. In fact, I have seen a fairly good crop of Jonathans where other varieties had failed. In a good many sections where the climatic influences are favorable to it, this variety has proven a very satisfactory varietly both for home use and commercial purposes.

D. G. Passmore

ENSEE APPLE.

THE SACKETT & WILHELMS CO., N. Y.

Prof. Watts.—Is it a standard variety for planting widely in this State?

Prof. Gould.—That is probably a matter to be determined. I would not recommend it as a variety to plant widely; there are other varieties that I think are better for extensive planting in this State. I notice in the exhibit of Mr. Wertz—his orchard is near Waynesboro—a plate of Jonathans. I don't know whether these trees received special attention or not. Where they can be grown to the perfection of those specimens it is worth the effort. It has been grown in New York State, in fact it originated in New York, and is grown some in the Hudson River Valley, but the tree is a little weak, and so is the foliage, and it is quite susceptible to cedar rust. That is my objection to it.

Prof. Watts.—What kind of soil does it grow best on?

Prof. Gould.—I have seen it grown on a wide range of soils. In the Ozark region the soil is somewhat rocky, quite porous and very deep; you could go a great many feet in depth and still find that same kind of soil for the roots to penetrate. Then, I have seen it grow in the black loam of the prairie, and in the Shenandoah Valley of Virginia it does fairly well, though not yet of much commercial importance in that section. There are several orchards of it on the famous "apple pie ridge," which is a soapstone soil, containing quite a good deal of small rock fragments, and has a porous subsoil of great depth.

The Secretary.—How does the quality of the Magnate compare with the Stayman Winesap?

Prof. Gould.—I think it is fully as good. Many of you know the Stayman. There are some fairly good specimens on exhibition here, although they look as if they grew on young trees.

The Secretary.—What do you think about the market in general for such a mild flavored apple as the "Delicious"?

Prof. Gould.—I think there is a splendid opening for the Delicious. I have seen some grown in New York that would be classed as sweet, but I think the mild, delicate flavor of Delicious from most sections is pleasing to people generally.

Mr. Engle.—Is the skin not very tender, and does it not bruise very easily in the handling?

Prof. Gould.—I don't think so; I think that with proper handling it will compare favorably with other varieties of high quality for a shipping apple.

Mr. Engle.—Excuse me, but how do you spell the Ensee?

Prof. Gould.—The Ensee was originated on the farm of Nelson Cox, and either he, or one of his sons, took the initials and spelled them out to make the name.

The President.—Any further questions?

Mr. Case.—Do you know the Longfield?

Prof. Gould.—I have seen it quite a good many times, but am not intimately acquainted with it. It is grown in some portions of the Mississippi Valley, Iowa, and that section of the country, more than anywhere else. Probably a very good variety in a section where hardiness of tree is a consideration.

Mr. A. R. Tyson.—The Coal?

Prof. Gould.—That is a variety which is commonly found in the mountainous region of Tennessee, and some other southern sections. I was rather surprised to see some as far north as Pennsylvania. There are some good specimens over there in the exhibit.

The President.—How about the quality?

Prof. Gould.—Not very good quality. There are enough varieties of better quality for this part of the country.

A Member.—Stewart's Golden?

Prof. Gould.—One of the old varieties that some of you probably know better than I do. I am not very familiar with it. Some growers in the northern fruit belt find it very satisfactory. Whether it would prove profitable in this State, I am not able to say. I do not know enough about the variety, about the quality or its requirements, to be able to tell much about it.

A Member.—Wolf River?

Prof. Gould.—A great big variety; if you want to grow monstrosities in the way of size, it might be all right, but I think there are other varieties that are better for general cultivation.

A Member.—Is the Doctor you mentioned the same as the Red Doctor?

Prof. Gould.—I don't know; I saw some specimens in the exhibit labeled "Red Doctor," but did not recognize them as "Doctor." I have seen it exhibited as "Newby," and where it is not called the Doctor, it is generally known as the Newby. It is an old variety that was re-discovered some years ago by Thomas Newby of Carthage, Indiana. One severe winter when other varieties froze, it did not, and in that way it attracted his attention, and after a long time, and many efforts, it was identified as an old variety known

as the Doctor. It is of fair quality, but not the highest. In one of Mr. Taylor's Year Book articles it is recommended for trial from Maryand north.

Mr. Case.—The Boiken?

Prof. Gould.—I know nothing about it in particular. It is one of the Russians, however, and they are mostly lacking in quality.

A Member.—What is the difference between the Gano and the Ben Davis?

Prof. Gould.—Well, if you take a good specimen of each, and pare them, then attempt to distinguish one from the other, I don't believe you could do it. Gano is solid red in color while Ben Davis is more or less striped.

Mr. Smythe.—Steele's Red or Canada Red?

Prof. Gould.—Of very excellent quality, and grown in some of the oldest New York and Michigan orchards. I don't believe it is grown very much in the newer orchards. It is late in getting into bearing, if I remember correctly, but when you get it, it is thoroughly fine.

A Member.—What do you think of the Wagner as a commercial apple for southern Pennsylvania?

Prof. Gould.—I don't know very much about it as a bearer. I think it was Mr. Lewis who said it was bearing well in his orchard, and if the tree makes any pretensions to being a good bearer, it should be an excellent apple. It is of high quality.

The Secretary.—It is generally so exceedingly productive that it is no good without thinning.

Prof. Gould.—That is a very good characteristic; if you can get them on the tree, you can get them off.

A Member.—The McIntosh?

Prof. Gould.—Showing up very nicely in some sections. Many growers tell us that it needs high culture and thorough spraying to bring it up to its best. For a choice commercial apple of high color, I presume in some sections of the State it would be very satisfactory.

A Member.—The Tetofski?

Prof. Gould.—About the same in season as Red Astrachan; one of the early apples, and quite satisfactory so far as productiveness is concerned, but I think there are other varieties that are better. It is very poor in quality.

A Member.—How about the Starr?

Prof. Gould.—I think I am not giving away any New Jersey secrets when I say that over there they think they have a mighty good thing in the Starr, but they are not saying much about it. Many of these apples are marketed as soon as they get large enough for culinary purposes. It holds to the tree well, however, and it can be left until fully matured if market conditions call for it.

A Member.—York County Cheese?

Prof. Gould.—I don't know that variety.

A Member.—There are quite a few samples of them in the hall, and the man that raised them thinks a great deal of them. I should like to know whether this is simply a local name, or a general name.

Prof. Gould.—I am not familiar with it.

A Member.—The Aiken—do you know anything about it?

Prof. Gould.—Nothing in particular. It is a good-sized apple of fairly good quality. I don't know whether it would be desirable to grow it in this State, but possibly it is worthy of a trial.

Mr. Engle.—A few years ago at a horticultural meeting in this State, I heard a gentleman speak of an apple that has not been mentioned here, but before which, he said, all other qualities paled; it may not be very well known here, but it is known in England, and is called Cox's Orange.

Prof. Gould.—It is of very fine quality; the great difficulty we have in this country with it is lack of productiveness; we don't often see it in any of our orchards, however, but it has an exquisite flavor.

The President.—Now, we are very glad to have some one here who can tell us all about the varieties, and I know we could keep Prof. Gould busy all day, telling us about quality and variety, but we have several other able men who must go away this afternoon, and we must go on with our program in order to gain time.

I am now going to call on Mr. Catchpole to tell us about "The Apple Industry; Its Present Condition and Future Possibilities."

THE APPLE INDUSTRY; ITS PRESENT CONDITION AND FUTURE POSSIBILITIES.

By E. W. Catchpole, *North Rose, New York, President, Cornell Horticultural Union.*

Mr. President, Members of the Pennsylvania State Horticultural Association, and Friends: It is a great pleasure to me, a grower of apples from western New York, to be with you at this

time. I bring you the fraternal greetings of several organizations of the Empire State. I am deeply interested in the enthusiasm manifested and I am sure your efforts are bound to bear much fruit.

This is a period of many changes in the apple industry in this country. Everywhere, from coast to coast, the one aim is to raise the standard of our product. As a typical example of this new era in the fruit industry, allow me to refer to conditions in western New York.

In 1865-70 the apple orchard of western New York consisted of from two to four acres, the trees had no definite character and the varieties were many. Any profit coming from these orchards was regarded as so much money found. Owing to disease, neglect and decay many of these old orchards are rapidly going out. A large portion of these older orchards that are now bearing, are producing fruit, at best, of only medium quality and little of it is being barreled. Some years later, after the west had begun to develop its resources in the production of grain and the western New York farmer was even loosing money on the poorer land, some of the more prosperous farmers tried the planting of apples in a moderate way.

In many cases through better care and proper soil selection the profits in after years were considerable. These few profitable commercial orchards set progressive men thinking. The result is the enormous planting of the past few years. In the west, however, this planting fever did not have the gradual development there was in the east. All at once there came the desire to plant. Owing to climatic conditions and perhaps to some extent to other conditions, they have had very few good crops. In the Ozark region, I am told, they have had but two paying crops since 1897. In our own State we have had other large crops, but they have not been profitable owing to over production. Considering the fact that the average age of a commercial orchard in the west is but twenty years, you can see they are facing a serious condition.

We should consider the question of over production, together with the effect it will have on future planting. The history of our section, the reports of earlier fruit meetings held more than forty years ago, all show that over production was seriously considered and its results feared. The question of the extent of future planting now receives less consideration than it has at any time in ten years. On the other hand we thumb over the proceedings of the meetings of years gone-by to find much fear and doubt as to the ultimate ability of the markets to care for increased production. Many of us recall the catastrophe of 1896, when the government tells us that there were over sixty-nine million barrels produced. This record has never been approached since. In 1908 the production was only thirty-eight million barrels. Cannot this difference be accounted for on the assumption that these little old three-acre orchards of grandfather's time are things of the past in the production of barrelable fruit?

The tendency now is to give better attention to the orchard. Fruit growers realize now that an apple tree is a business proposition. To succeed, the utmost care must be taken in the selection of

varieties adapted to the soil. Judgment must be used in the maintaining of fertility and the conservation of moisture. Economy in harvesting and shipping might be called a business in itself. In fact the money end of the game needs the man behind the gun.

We are all asking the question—What about the West? We admire with envy, the glare of the advertising their publicity press agents are spreading broadcast. When papers like the Saturday Evening Post will give them the next thing to free advertising we will surely have to admit that they are progressive. We have a right to view with alarm their invasion of our eastern markets. In New York we are raising fruit fully as fine as that of the West, but we have never been able to get it before the public in that attractive way. As a result of all this advertising, the public has come to believe that size means quality, and the western fruit is better than ours. At our recent banquet both western New York and Pacific coast Spitzenburgs were served at every plate and there was a unanimous verdict in favor of our native apple. The boxing seems to produce a favorable impression on the public and I will suggest that some of you try boxing your fruit in a small way the coming year.

Just now we are not in right in the marketing end of the deal. The grower is not getting his share of the consumers money. The consumer is not getting the quality he pays for with his good money. Mr. Hale said at our banquet that we will never have a satisfactory market until the distribution is controlled by one man, and one man only. He is probably right.

The railroads in our State are taking a deep interest in the growing of fruit. Under former methods the higher officials depended almost entirely on reports furnished them for information regarding crop and fruit conditions and the freight tonnage in sight for each season's business. Leading growers and shippers were not known personally to the officials. A feeling of antagonism existed between shippers and transportation companies. Some one suggested that the "Big Ones" of the R. R. Co. be invited to visit our fruit belt on the South Shore of Lake Ontario. As a result they came, they saw and were made members of the "Apple Consumers League."

As to results—A recognition of the fact that each have interests in common; that the proper handling and transportation of orchard products would stimulate the planting of new areas—the development of new territories where land is cheaper but just as well adapted to fruit culture as the present well-known but high priced areas.

The Growers and Shippers exchange, with headquarters at Rochester, N. Y., was organized last July with a capital of $40,000 in $100 shares, and duly incorporated under the laws of the State. It has a board of fifteen directors, business manager, and sales manager, acts as a clearing house for local associations, growers, and shippers associated therewith, charging 5 per cent. for selling and distributing products. Salaried agencies are maintained in the leading market centers with security bonds for all persons holding positions of trust.

Six local associations, each holding stock in the parent organization, have been organized. One of these, with a membership of

one hundred, has handled the crops of its members and since the close of the season has nearly doubled its membership. Local associations or members may establish brands or retain brands and identity but will be held sponsor for quality. Local co-operative packing is encouraged by the exchange that a large quantity of uniform and properly packed fruit will be available for shipment. Organization and co-operation are absolutely necessary that the products of our orchards and vineyards may be grown, packed and distributed,—that the consumer may be educated that neither size nor color necessarily mean high quality,—that if necessary, retail stores be opened in large cities, and stocked with the best at a reasonable prace. At present far too many fruit stores push the sales of tropical fruits while holding our own products at exhorbitantly high prices.

Delegates to the Farmers' National Congress at Raleigh, N. C., were shown the results of applying science to Pomology, the effect of soils on varieties.

The future offers great opportunities to the individual or corporation fully equipped for this work. Soil, varieties, management, fertilization, harvesting, packing and marketing—each and all must be carefully studied under varying conditions. Eliminate the limiting factor and success should be yours.

You certainly are ahead of the times, and I want to say to these good people here who are not members of this organization that they should not leave the hall without becoming members, and those of you who while enrolled as members, are not active members, it is your duty to do all you can in aiding to grow the apple in the Keystone State. I thank you.

The President.—Mr. Catchpole has given us a sufficient number of good things to keep us busy thinking; while we will not elaborate on them, I would suggest that we take fifteen minutes, at least, for the consideration of the subject he has presented. If any one has any questions to ask, Mr. Catchpole will be pleased to answer them.

A Member.—I would like to have Mr. Catchpole tell us more fully about their Fruit Growers' Market Association.

Mr. Catchpole.—Our Association was formed last July. The plan is briefly this: The local organizations are feeders for the parent organization. They take over 50 per cent. of the stock. The Candaigua Association has been doing a good business, and have a membership of one hundred, which they hope to increase to two hundred. The other local organizations, also, have done fairly well, our manager and sales manager taking the stand that we could not afford to send any but perfect fruit, perfectly packed to market.

A Member.—Does the organization attend to the packing, or only to the selling?

Mr. Catchpole.—Only the selling. It has been suggested that the local organizations take up the packing end, in this way making the individual responsible for the quality of his fruit.

A Member.—Can he put his name on it?

Mr. Catchpole.—If he wishes. We have written eleven thousand letters, covering the entire United States, letting the people know that we were doing business, and briefly outlining our plan of organization. I have here our Constitution and By-laws; if any one would like to have copies, we can supply them.

Mr. Fox.—I desire to elaborate on one point, and that is the co-operation of the railroad company, the carriers in this matter of transportation. In years past the railroads in our State of Pennsylvania did all they could to discourage the apple industry by their treatment of the shippers and their freight charges. They are now beginning to realize the folly of their course through the decline of their freight traffic.

Then the results of co-operation are seen in counties like Adams and Franklin, where the railroads are co-operating with the shippers. Twenty-five hundred carloads were shipped last fall out of that district, chiefly Adams and Franklin Counties, with perhaps a few from northern Virginia. This means business for the railroads, and they are co-operating with the Associations, and with the Department of Zoology in running demonstration trains. Prof. Surface has been in correspondence with them, and last winter these demonstration trains were visited by thousands of interested spectators. We held sixty demonstrations, which were attended by more than six thousand people. It is planned to repeat these demonstrations this winter; the railroads realize the importance of standing by the fruit growers of the State.

The President.—Any other questions? If not, we will proceed.

SOME NEW SPRAYING MIXTURES AND THEIR VALUE AS FUNGICIDES.

By M. B. Waite, *Pathologist in Charge Fruit Disease Investigations, U. S. Department of Agriculture.*

For over twenty years bordeaux mixture has been the leading fungicide. Its early successes in the treatment of grape diseases were followed by similar triumphs in the control of apple scab, apple leaf-spot, pear scab and leaf-blight, and finally the dreaded bitter rot. The apple blotch of the Southwest, curl leaf of the peach and the gumming fungus of this fruit on the Pacific Coast gave way before this remarkable fungicide. Following its discovery in 1883 or '85 for a period of about ten years,—that is from 1885 to '95, many efforts were made and much experimenting was done in the hopes of finding a better copper compound. It was hardly thought possible that the best copper spray had been hit upon at first. These efforts to find a better copper compound did not succeed. On the other hand, they placed this mixture at the head of the list of fungi-

cides. Practical use by orchardists in the protection of their fruits by spraying still further strengthened the status of this fungicide until it had come to be regarded as the only great fungicide for general use in the orchard in the summer time.

General use of this mixture, however, both by experimenters and orchardists, began to develop certain weaknesses. It was soon found to be a complete failure on the peach and the Japanese plum, injuring the foliage so badly as to be ruinous. It also injures the foliage of a number of other plants. In recent years it has been found to cause serious russeting of the fruit of the apple and sometimes a similar russeting and deforming of pears. This russet damage apparently has been increasing, for reasons entirely unknown to the writer. For instance, in 1899, I carried on experimental sprayings on the Newtown in Virginia, with no noticeable injury to the fruit. Furthermore, the foliage of the sprayed trees remained sound and bright instead of being seriously injured as has been the case in the last few years.

Various recommendations were made last season to avoid this fruit russeting and foliage injury. One was to dilute the copper to 2 lbs. and add an excess of lime, using such a formula as 2 lbs. of blue stone, 3 lbs. of lime to 50 gals. of water. Another was to use the self-boiled lime-sulphur, then coming rapidly into prominence through the experiments of Mr. W. M. Scott, of the Bureau of Plant Industry. Mr. Scott developed this self-boiled lime-sulphur as a summer spray for the peach, the most susceptible to copper poisoning or spray injury of any fruit. He also found it harmless on the apple.

It was a question, and still is for that matter, whether the self-boiled lime-sulphur will serve all the purposes as a fungicide, of bordeaux mixture. Notwithstanding, therefore, the possible ways out of the difficulty it was felt, at the beginning of last season, that the whole system of apple spraying by the old method with bordeaux mixture was open to serious question. On the other hand fungous diseases appear to be rather on the increase, especially the apple leaf-spot or leaf-blight, cedar rust, and the danger of bitter rot and apple scab is always so great, not to speak of the insect troubles, as to compel thorough spraying of the orchards. All will admit that spray we must to get high percentages of sound, marketable fruit. What to spray with, therefore, and not introduce a new disturbing injury, was the question. Something had to be done to get further light on this problem. What the orchardist needs is a fungicide which can be combined with a good insecticide, like arsenate of lead or possibly Paris green, or some other arsenate, that will do thorough work in the prevention of the diseases and at the same time be absolutely non-injurious to both fruit and foliage.

The ideal fungicide not only protects the fruit through various stages from the attack of fungi, but combines readily with an arsenical and leaves the skin bright and smooth with all the style and finish that it is possible for the given variety of apple to develop. With the leaves, it should not only protect them completely from all attacks of fungi, but should permit or even stimulate full de-

velopment of the foliage so that every leaf, or at least a very high percentage (90 per cent. or more) should be on the trees at the time the fruit is picked. They should even persist for a considerable period thereafter. You all know how far short of this condition has obtained in the use of Bordeaux mixture during the last few years.

In order to study this matter thoroughly a rather elaborate series of experiments was carried out at Winchester, Virginia, during the past season (1909). Nine different fungicides, that is counting arsenate of lead used alone as one, were included in the test, which, together with a control plot at the beginning and end, made eleven plots. The object of this test was to bring into careful comparison standard Bordeaux mixture, with various modifications of the same, and with self-boiled lime-sulphur and other sulphur compounds. These were the most promising fungicides known to the writer. Among the number, two new fungicides were invented and subjected to test, namely, a new copper sulphide mixture and a new iron sulphide mixture. Rather to our surprise these two mixtures have proved to be remarkably good and interesting. One of them, the new type of iron sulphide, may have a promising future.

The plan of the principal experiment carried out in Mr. S. L. Lupton's home orchard was as follows:

Purpose.—To find a spray mixture which will satisfactorily control fungous diseases but which will not injure the leaves and fruit of the most susceptible varieties of apple.

Carrying Out of the Experiments.—In carrying out this plan two main series of experiments were tried:

Series I.—On the S. L. Lupton Home Farm. This block contained the whole eleven plots of the experiment. Each plot consisted of 4 Ben Davis, 4 Newtown and 2 York Imperial trees, except where they were missing in the orchard, all of which were fourteen years of age. In other words, the orchard was planted in strips of 4 rows each of Ben Davis, Newtowns and York Imperials. The fungicide tests were run across the strips including all three varieties.

Application of the sprays was at the rate of 45 to 50 gals. to each plot of 10 trees, applied through ordinary fine nozzles by means of a hand barrel pump. The dates of application were the three ordinary applications for the apple required for codling moth and other insects, combined with the treatment of apple leaf spot, cedar rust, and ordinary fruit spots. This did not fully cover the early treatment for apple scab, which was not expected and did not occur in the orchard, nor one late treatment for bitter rot.

The first application was made May 11-12, shortly after the petails had fallen; the second application was made June 11-12, just a month later; and the third application was made July 19. The first application was made in time to fill the calyx cups with the arsenite and in season to catch early infections of cedar rust and leaf blight on the young fruit. It is also a good application to protect from apple scab though not always safe for the first treatment of this disease. The second application, on June 11, was probably

a little late for best results. June 1 to 5 would probably have been better. It is intended to catch the codling moth at the time of hatching and feeding, and as the trees are just in full leaf, is the best time to spray for apple leaf spot, and perhaps also cedar rust. It is doubtless the most important single treatment. The third application, on July 19, also possibly a week later, is an excellent date for last summer treatment for fruit spots and leaf diseases and is timely for second brood codling moth and lesser apple worm. These dates were arranged in conference with Prof. A. L. Quaintance of the Bureau of Entomology, who is responsible for the insect information in this paper.

Series II.—S. L. Lupton orchard (Barker Farm.) As the trees in Series I carried but a light crop of fruit, a supplemental experiment, or a duplicate, was carried on in Mr. Lupton's "Baker" farm, selecting the more important or more promising of the fungicides. Unfortunately we left out the iron sulphide as we did not consider it, at that time, especially promising. This series was located in a block of Ben Davis trees, 14 years old, larger and better cared for than the home farm and carrying a fine crop of fruit. Each plot consisted of 4 Ben Davis trees. The spray dates, May 12, June 14 and July 17, were within a day or two of the other series.

Series III.—A supplemental series was also carried out in the orchard of Mr. Stuart Bell, using about the same dates of treatment, but selecting only the self-boiled lime-sulphur and the copper sulphide mixture for comparison.

Series IV.—P. H. Gold farm, Winchester, Va. Another supplemental test on York, and Ben Davis trees, using also about the same dates of treatment, was carried on on Mr. Gold's place, comparing the self-boiled lime-sulphur with standard Bordeaux mixture.

To all these gentlemen our thanks are due for offering their orchards for experimental purposes. We feel that special thanks are due Mr. S. L. Lupton, because, on account of having the right varieties, suitable location, age of trees, etc., his orchards were made to carry the brunt of the experiments. We are indebted to Mr. Lupton for many courtesies, not only in facilitating the spraying work, sacrificing his fruit to these tests, but in helping in taking down the results and in storing the fruit and exhibiting it for our study.

I am also indebted to my assistant, Mr. F. V. Rand, for much painstaking help in carrying out the spraying work and in attending to the details of result taking.

Results.

We began note taking on the results at the time of the second treatment on June 12. Interesting things began to happen at that date. All the copper sprays began to show more or less serious injury to both fruit and foliage. Notes were taken separately on the leaves and fruit of every plat. On Series I, of Mr. Lupton's home farm, there were eleven plats with the two controls, and three varieties on each mixture, making thirty-three distinct plats. Notes

were taken as to both fruit and foliage, making sixty-six notes for this series. The same thing was done at the "Baker" farm and on the other series. These notes were taken June 12, July 4, August 5, and September 8 and 21, and at picking time. Further notes were taken January 5, after the fruit had been in cold storage.

All the fungicides protected the trees very nearly completely from fungous diseases. In the note taking, therefore, except on the unsprayed plats, it became almost wholly a question of per cent. of injury to foliage by the spray itself, and in the same way on the fruit it was a question of per cent. of russeting or spray injury. I have all the data in my hand of these different percentages, including final notes, and per cents. of first and second-class fruit, drops and culls, at the picking time, but of course you do not wish this mass of detail.

Let us pick out from the whole the most interesting and instructive portions. The final notes of the condition of leaves and fruit on each of the plats, taken September 21, a few days before picking, may be of interest.

Series I.—S. L. Lupton's home farm. Percentages indicate amount of damage estimated.

Plot I.—Control, unsprayed. Ben Davis, 4 trees:

Plot I.—Control, unsprayed. Ben Davis, 4 trees:

Leaves—
Fungus, ... 60 per cent.
Spray injury, ... None.
Fruit—
Insect and fungus, ... 90 per cent.
Spray injury, ... None.

On the Newtown and the York Imperial there was a slightly less serious injury.

Plot II.—Bordeaux Mixture 3-3-50. Ben Davis, 4 trees:
Leaves—
Fungus, ... 1 per cent.
Spray injury, ... 30 per cent.
Fruit—
Fungus and insect, ... 2 per cent.
Spray injury, ... 60 per cent.

Newtown, 4 trees:
Leaves—
Fungus, ... 3 per cent.
Spray injury, ... 80 per cent.
Fruit—
Fungus and Codling Moth, ... 2 per cent.
Spray injury, ... 30 per cent.

York Imperial, 2 trees:
Leaves—
Fungus, ... 2 per cent.
Spray injury, ... 25 per cent.
Fruit—
Fungus and insect, ... 2 per cent.
Spray injury, ... 3 per cent.

It will be observed that standard Bordeaux mixture injured the fruit by russeting from 60 per cent. on the Ben Davis to 30 per cent. on the Newtowns to 3 per cent. on the York Imperials. The foliage, on the other hand, was most injured—up to 80 per cent. on the Newtowns. All the other copper compounds injured the fruit of the Ben Davis with the exception of neutral Bordeaux, however, all of the modifications of Bordeaux, by adding other materials, reduced the injury.

As the whole group of copper compounds except copper sulphide injured the fruit so much as to be undesirable, I will only take one single element of the notes on most of this group, namely, the russet injury on the Ben Davis fruit, assuming that the other injuries were somewhat in proportion.

Plat 3, the iron Bordeaux injured the fruit 40 per cent. It was decidedly less injurious to fruit and foliage on the Newtown and York Imperial.

Plat 4, Bordeaux and Gypsum. Fruit russeted on Ben Davis 30 per cent. It gave about a corresponding reduction of injury on Newtown and York Imperial. The reduction of injury by gypsum and iron Bordeaux would be of interest if it were not for the more successful fungicides in the test.

Plat 5, Neutral Bordeaux. Fruit of Ben Davis russeted 60 per cent. The interesting thing happened in this mixture, namely, that while it injured the Ben Davis no more, or possibly slightly less during part of the season, than standard Bordeaux, it injured York Imperials much more seriously. It therefore had no special advantage—if anything, a disadvantage, over standard Bordeaux mixture. This emphasized the fact, which had heretofore been found in spraying the peach, that a slight excess of lime was helpful. This is also further backed up by the comparatively better results obtained by Mr. Lupton in his orchard spraying with the 2-3-50 Bordeaux.

Turning now to plat 7, the copper sulphide, we have a change in the figures. The Ben Davis fruit was injured only 10 per cent., the foliage was injured only 1 per cent. Further than this, all the other marks on both the Newtown and the York were practically perfect. Here again we can say that were it not for the superior results with self-boiled lime-sulphur and iron sulphide we should certainly consider that in this new fungicide we have a splendid find. We certainly can say this, that if sulphur mixtures do not hold out, we have in the copper sulphide, made with self-boiled lime-sulphur as a basis, the least injurious form of copper. On the Newtown, and on the York Imperial, and possibly this may be true of other varieties, it is almost, if not quite, absolutely harmless. The 10 per cent. of russeting on the Ben Davis might be reduced by cutting down the amount of copper.

Turning now to plat 8, this is also a copper sulphide, but made with the commercial lime-sulphur solution instead of the self-boiled lime-sulphur. It was distinctly inferior to the other type of copper sulphide. The russeting of the Ben Davis was only slightly more serious, being 15 per cent., but the foliage injury throughout

was quite pronounced, being 10 per cent. on the Ben Davis, 40 per cent. on the Newtown and 15 per cent on the York Imperial.

Turning now to the really good things in the test we are able to abandon this record of troubles almost completely. Plot 6, the self-boiled lime-sulphur, gave almost perfect results throughout. There are absolutely no spray injury to both fruit and foliage on the three varieties tested. There was a half per cent. of russeting marked on the Ben Davis but this is wholly around the stem and was undobtedly due to the arsenic or to water alone. The percentage of fungus injury to leaves was slightly greater with this fungicide as might be expected, namely, 2 per cent. on the Ben Davis, 3 per cent. on the Newtown and 4 per cent. on the York Imperial. This was mostly cedar rust and apple leaf spot and was entirely insignificant in quantity. They are just enough perhaps to call attention to the slight doubt as to fungicidal strength which hangs over this mixture. Undoubtedly the self-boiled lime-sulphur mixture is the most harmless fungicide known. The only question being, can it be depended upon to do the work. Under the conditions obtaining at Winchester last season it stood up very well. It failed, however, on pecan scab in the South, due, probably, to very heavy rains, and as Mr. Scott has pointed out in his apple scab work, it was not quite equal to Bordeaux mixture. It also was inferior to Bordeaux mixture in my own orchard with apple leaf spot, and the fruit spot of the apple, though on the whole the results were better than with Bordeaux mixture.

Turning now to the last fungicide, namely, the iron sulphide, we have apparently the most successful mixture in the series. The fruit russet on Ben Davis was zero and so was also the leaf injury. A perfect mark was secured as to leaves and fruit of all varieties. The fungus injury on leaves of all three varieties was marked at one-half per cent. This was less than with any other fungicide on the test, including the Bordeaux mixture, although with the Bordeaux mixture there is a possibility that some of the spots marked "fungus spots" may have been copper poison spots. In this mixture (iron sulphide) we have the advantage both of high fungicidal value and an entire absence of injury effects,—apparently the best combination of quality.

It should be noted that the fruit of the Ben Davis particularly was slightly a darker green and apparently later in ripening than on most of the other plats, notably, than on the self-boiled lime-sulphur. In the case of the Pippin this made a greener appearing type of fruit. On the Ben Davis it perhaps might be regarded as slightly objectionable though probably not on the Pippin and York Imperial. The foliage also looked darker green and heavier and it was a noticeable fact that the twig growth looked more stocky and especially the fruit buds looked plumper, than with any of the other fungicides.

One point should not be overlooked, namely, that the arsenate of lead gave remarkably good results and entire freedom from russet injury. Some of the Winchester orchardists, namely Messrs. Bell, Gold and Richardson, called my attention to the apparent success of this insecticide in controlling fungi which they had observed

in the season of 1908. At the time I doubted it but the results of the arsenate plat certainly looked promising. The two pounds of arsenate of lead under the extremely favorable conditions in the Winchester district seemed not only to protect from insects but to control apple leaf spot, cedar rust, and the fruit spots.

Since this mixture was also in the self-boiled lime-sulphur and in the iron sulphide solution the question may be raised, was it not practically responsible for the beneficial effects. Self-boiled lime-sulphur, however, has a series of victories in Mr. Scott's experiments that do not rest on this single test.

Iron sulphide, made with a sulphur solution, in the experiments of Mr. Volck, at Watsonville, Calif., on apple mildew and by Mr. W. S. Ballard, my assistant in that district, have shown it to be superior to Mordeaux mixture, for that disease. Why may not this superiority extend to certain other fungi?

Conclusions.

Self-boiled lime-sulphur gave practically perfect results under the conditions obtaining at Winchester. As a spray for Ben Davis and perhaps also for Newtown and York Imperial it was a practical success. Since it has been experimented upon widely by Mr. Scott for three years, it may be regarded as a perfectly safe fungicide to use for commercial purposes as far as injury is concerned.

It is evident also from the tests that the iron sulphide, made in the new form here described, is a promising fungicide which needs testing on a commercial scale. If it maintains its apparent superiority it may have practically all the advantages of the self-boiled lime-sulphur in overcoming injurious qualities and of Bordeaux mixture as an effective fungicide. In that case it promises to be a great commercial spray. Copper sulphide is the least injurious form of copper spray and solves the russet problem as far as the Newtown and York Imperial are concerned, and gave only one-sixth of the injury on the Ben Davis produced by 3-3-50 Bordeaux. We have in these experiments the solution of the russet problem in several different ways. Further experiments on a large scale are necessary to test fully the merits of the different non-russeting sprays. The results argue strongly the necessity of abandoning Bordeaux mixture on the apple and the substitution of some form of lime-sulphur, iron sulphide or possibly, if we must use copper, the copper sulphide.

Preparations of the New Sprays.

At the conclusion of the paper, a sample jar each of the new mixtures was made up and also for comparison the standard Bordeaux mixture, self-boiled lime-sulphur, with and without the arsenate of lead. The materials being of very bright colors, varying from light blue to bright lemon yellow and from reddish brown to jet black, made a very interesting color contrast. Bordeaux mixture, made up in the ordinary way, showed the characteristic sky blue color.

A batch of self-boiled lime-sulphur was made up suitable for spraying peaches. It was diluted promptly after the lime finished slaking and was therefore of a bright lemon yellow or sulphur yellow color. Another sample was allowed to stand twenty minutes while hot to complete the boiling, and while it was rather bright yellow in color, it showed a slight brownish tint and an inch or so of clear liquid at the top of the jar was distinctly brownish. A similar sample of self-boiled lime-sulphur was treated by adding the equivalent of 2 lbs. per barrel of arsenate of lead. There was a distinct though not very pronounced dull grayish-brown color produced a few moments after the addition of the lead arsenate. To another jar of the self-boiled lime-sulphur mixture a solution of blue stone or copper sulphate was added. On shaking up this developed the distinct reddish brown color of copper sulphide more or less obscured and modified by the excess of yellow lime-sulphur mixture. To still another jar of the self-boiled lime-sulphur mixture a solution of iron sulphate or ordinary copperas was added. This at once turned the mass to an inky black color. To complete these last two mixtures lead arsenate was added to each of them but any further color change was obscured by the reddish-brown color of the copper sulphide or the black of the iron sulphide.

Formulae for the new sprays.—To prepare a barrel of either the new iron sulphide or the new copper sulphide, make first the self-boiled lime-sulphur as a basis. In experimenting we used the 10-10-50 formula but for commercial work the 8-8-50 should be used.

To make the self-boiled mixture first place 8 lbs. of good stone lime in the bottom of a barrel; pour on enough cold water (hot water if the lime is distinctly inferior) to nearly cover the lime. When the lime begins to slake vigorously add 8 lbs. of sulphur flour. This should be run through a sieve and preferably mixed with a little water in the form of a slush. Stir the sulphur into the slaking lime occasionally. Keep the barrel covered with gunny sacking, old carpets, or some suitable cover to retain the heat. Water is added occasionally to keep the mass in a slushy or creamy condition. For these mixtures on the apple cease stirring as the slaking diminishes in violence and before it has finished, and replace the cover allowing it to remain twenty minutes. At the end of this period the mass will have turned slightly brownish. Dilute, first by adding a little water, and stirring, to 50 gallons.

For making iron sulphide dilute to about 40 gallons instead of 50, then add 3 lbs. of iron sulphate (ordinary copperas) dissolved in 6 or 8 gallons of water and stir. This makes the black iron sulphide. Then add 2 lbs. of arsenate of lead stirred up as a milk into two or three gallons of water, thus completing the barrel to 50 gallons. The formula for this mixture then is:

Self-boiled lime-sulphur, 10-10-50 (or 8-8-50).
Iron sulphate, 3 lbs.
Arsenate of lead, 2 lbs.

To make the copper sulphide, proceed in the same way. After diluting the barrel of self-boiled lime-sulphur to about 40 gallons, add 2 lbs. of blue stone or copper sulphate dissolved in 6 or 8 gal-

lons of water and stir. The mass will then turn to the bright reddish-brown color of copper sulphide. The 2 lbs. of arsenate of lead is then added, as above, to complete the mixture.

Mr. Case.—Are you going to tell us later on, the strength of the Bordeaux you used?

Prof. Waite.—Yes; but I might say right here that it is 3-3-50 in the experiment. In the orchard for general spraying we used 2-3-50, and that is better.

Mr. Case.—What kind of weather did you apply it?

Prof. Waite.—Rainy and damp. Later on it was unusually dry, which gave the spray mixture a better chance to take a good hold.

Mr. Case.—Did you have the steam guage on, so that you knew the pressure you were putting it on with?

Prof. Waite.—No; we used an ordinary hand spray; running about 60 pounds; it may have run to 80, and possibly dropped to 40. It ran somewhere between 60 and 80.

The President.—It is now twelve o'clock, so we will adjourn until 1:15, so as to give Prof. Waite at least fifteen minutes' extra time.

TUNKHANNOCK, PA., THURSDAY, JANUARY 13, 1910, 1:15 P. M.

President Hiester in the Chair.

The President.—The meeting will please come to order. Prof. Waite will now resume his talk.

Prof. Surface.—What is the formula for the copper sulphide?

Prof. Waite.—Self-boiled lime-sulphur, 10-10-50, or 8-8-50; then add to that mixture 2 pounds of copper sulphate in solution to 50 gallons. Now the iron sulphide is made the same way; make it with stock solution, use self-boiled lime-sulphur 10-10-50 to three pounds iron sulphate in solution, and then before spraying we add 2 pounds of arsenate of lead in each mixture.

Prof. Surface.—I would like to ask whether you have ever analyzed the sulphur in your concentrate?

Prof. Waite.—No, I have not, although Mr. Haywood of the Department of Chemistry, has analyzed some of these solutions.

Mr. Wertz.—Can you tell us whether this will be sent out in bulletin form in time for us to use in the Spring?

Prof. Waite.—I think so. I expect to spend the next few days in the office and get right to work on it. The full data of this work will be written up this spring and published in bulletin form.

Prof. Surface.—What have you to say regarding the concentrated lime-sulphur with the arsenate of lead in it?

Prof. Waite.—I read of that in the paper. Prof. Scott heartily approves of it. We don't know which one of these solutions is going to be the best, and perhaps a little safer than the others, but we do know that one of them will be the thing to use. It does not injure the tree and does help the foliage wonderfully.

Mr. Roberts.—Any objection to using that iron spray on potatoes?

Prof. Waite.—We have not used it, but I see no reason why it should not be used.

Mr. Wertz.—You think the self-boiled is better than the commercial?

Prof. Waite.—Yes, it is, a little.

Mr. Wertz.—But there is such a difference in the boiling; I might make it one way, and my neighbor another.

Prof. Waite.—Yes; there is as great a difference as there is in the housewife's making of bread, but you can easily test with the hydrometer how strong the concentrated mixture is.

Mr. Smythe.—How strong would you use it on peach trees?

Prof. Waite.—I have not said that I would use it on peach trees at all. We have not tried it; we have only used it on apples.

Mr. Gould.—Are these new mixtures any harder on the spray pump from corrosion than the old Bordeaux mixture?

Prof. Waite.—That is a point that I did not think about, and I am glad you mentioned it. I am sure that these two mixtures from their insolubility, will be less injurious than the other sulphur mixtures. The home-boiled lime-sulphur is probably harder on them than anything else.

Mr. Gould.—They will not be hard on brass?

Prof. Waite.—No; not so hard on copper or brass.

A Member.—Is there any preparation there to spray the black spots that appear on the Baldwin?

Prof. Waite.—There are two black spots of the Baldwin—one due to a fungus, and the other to some cause that has not yet been discovered. The one due to a fungus is preventable by spraying.

A Member.—Don't you think the soil has something to do with it?

Prof. Waite.—Yes; I think it has.

A Member.—What about the apple leaf blight?

Prof. Waite.—Oh, that is prevented by these mixtures; they will destroy it.

Prof. Stewart.—I would like to ask whether the lime-sulphur can be made up and kept on hand, or must it be made up the day it is used?

Prof. Waite.—I have only used this three times, and have always made up the lime-sulphur just before I used it.

Prof. Stewart.—Would it not be possible to make up an iron sulphide in the same way by using a concentrated sulphur solution?

Prof. Waite.—That was the former method. They would take the iron sulphide and let it decant, and repeat in three or four days. We got out of that, and made this preparation which can be gotten ready in a few hours.

Prof. Stewart.—Is there any real necessity for making it in the longer way?

Prof. Waite.—There may be new ways; we don't know how many new ways there are of making it up. This method was devised under pressure, and I would very much prefer to hold it back and test it a while longer, but its absolute harmlessness will recommend it for trial. The one danger is that it may fall down on some fungus.

Prof. Surface.—How many pounds of arsenate of lead?

Prof. Waite.—Two pounds to the barrel.

The President.—While Prof. Waite is completing his mixture, we will have the report of the Fruit Committee. Will Mr. Roberts report for the committee?

REPORT OF THE COMMITTEE ON EXHIBITS.

Mr. President: Your Committee on Nomenclature and Exhibits begs to make the following report and recommendations:

First, That this exhibit is by far the largest, most representative and complete, of any ever made at the annual meeting of this As-

sociation. For this reason, the committee, in the limited time at its disposal, were unable to give the careful attention which the exhibit merited. The report given below represents, in our judgment, the rank of exhibits when judged by the standard laid down by the American Pomological Society, which standard your committee was forced to adopt, in the absence, so far as we were able to discover, of any fixed rules governing the display.

Second, In this connection the committee suggests, and would urgently impress upon this Association, the necessity of adopting some set code of rules governing the display of fruit at all future meetings, in order that all exhibits may be judged on the same basis. Further, we would suggest that since the rules adopted by the American Pomological Society are considered as standard throughout the United States, and Canada, that these rules be adopted by this Association to govern all future exhibits, and that each County Association provide itself with a copy of these rules and acquaint its members with their provisions, or

Third, Should the Society choose to follow a more liberal policy in the matter of exhibits than that laid down by the rules named above, your committee would recommend that a special committee be appointed to draft such rules and regulations, as they see fit, governing such points as the number of apples per plate, polishing, uniformity of specimens, stems, relative importance of insect, fungous, or spray injured fruit, etc., and complete instructions to judges.

As stated above, your committee felt it necessary to adopt some standard for their guidance in this instance, and therefore followed the rules of the American Pomological Society as far as possible, with the following results:

We would recommend that the diploma for the best general or Association exhibit be awarded to the Fruit Growers' Association of Adams County, and that second place be given to the Wyoming County Exhibit. The committee would also make honorable mention of the exhibits from both Bedford and Perry Counties, which certainly reflect great credit upon these counties as great apple growing counties.

To C. J. Tyson, of Flora Dale, Pa., is awarded the Certificate of Merit, for best individual exhibit, and to R. M. Eldon, of Aspers, Pa., should be given second place. To W. J. Lewis & Bro., of Pittston, Pa., and F. H. Fassett, of Meshoppen, Pa., special mention is given for very creditable displays the former showing an exhibit of thirty varieties, as well as box-packed Baldwins, Sutton Beauty and Northern Spy.

To Gabriel Hiester, of Harrisburg, Pa., the committee would invite attention as the exhibitor of several varieties of pears.

A few plates of nuts were also shown, which reflects great credit upon Pennsylvania for her achievement in this important branch of horticulture.

On account of limited time, the committee has made no attempt to judge individual plates.

The total number of plates shown was 560, representing about 100 named varieties, and a few unnamed, some of which are said

to be seedlings but which your committee do not feel of sufficient merit to warrant their being added to the already long list of named varieties. Signed,

E. W. Catchpole,
W. J. Wright,
Horace Roberts.

On motion, properly seconded and regularly carried, this report was accepted and the committee discharged.

The President.—I am sure the judges are entitled to the thanks of this Association. They had a pretty hard task to judge this exhibit, but I think they have done it in a very acceptable way.

We are now ready to have Prof. Watts talk to us on "Asparagus Culture."

ASPARAGUS CULTURE.

By R. L. Watts, *Professor of Horticulture at Penna. State College.*

Asparagus is generally regarded as one of the most profitable garden crops that can be grown in this State. Soil and climatic conditions in Pennsylvania are favorable and it is not a difficult crop to grow.

The most experienced growers claim that deep, rich, sandy loams are best adapted to this crop. Sandy loams are especially desirable if the purpose is to produce white grass rather than green, because sandy soil offers no obstruction to the shoots and they are always straight and can be cut without difficulty. The tendency, on the other hand, of white shoots in clay soils is to become more crooked and the crop is harvested with greater difficulty.

There is an increasing demand for green grass, although the majority of growers claim that white grass is the more profitable. There are two main reasons for this claim. First, it is held that the injury from beetles is less on the white grass because a smaller per cent. of the shoot is exposed to the attack of the beetle. Second, that the diameter of the white grass is greater than the green and that fewer stalks are required to fill the bunches. When green grass is grown the rows may be closer together, because ridging is not required. It is also true that the price for green grass is usually higher and this probably makes up for the loss in size of shoots. Nearly all Americans prefer green asparagus and its production should increase consumption.

Although the sandy types of soils are preferred, good crops may be grown upon any kind of soil which is properly handled. Heavier manuring is required on the sandy soils and these soils of course are less retentive of fertility. For growing either green or white grass, the most important factors are the supplying of water and plant food. These two factors are of vastly greater importance than the question of soil type.

Conover Colossal is one of the oldest and best known varieties in the United States. It is early and vigorous. Barr's Mammoth is

also well-known. It is said to be one of the earliest and is a large producer of good sized shoots. Argenteuil is a French variety which has attracted much attention in recent years. It was thought by many a few years ago that this variety would take the place of many of the older varieties, but I believe it is losing rather than gaining at the present time. There is some evidence that the variety does not thrive on clay soils. A variety which is attracting more notice at this time than any other, and which is planted more largely than any other is Palmetto. The shoots of this variety are large and there is a small percentage of culls. It is generally regarded as the most profitable variety in cultivation. It is conceded that the variety is less subject to rust than any other, and some claim that it is comparatively secure from attack of insects. There seems to be no good reason for planting any other variety.

Many of the most successful growers of asparagus in different parts of the country prefer growing their own plants. They prefer this because it enables them to grow plants from selected seed and then to select roots from a large number of plants, from which the best results may be expected. To start with, seed should be secured from a reputable grower whose plantation is free from rust. An excellent plan is to visit these fields in the fall of the second year when seed should be selected from plants of a few large stalks rather than many small ones. The seeds are ripe when the berries are well colored. After picking, the berries should be placed in any convenient tub, barrel or crock and allowed to soak until the pulp separates readily from the seed. This separation may be secured by washing with the hands. The seeds should be washed several times and then cured and stored.

It is considered rather unsafe to use seed more than one year old. It may be planted in the fall, although spring is preferred. The drills should be fifteen to eighteen inches apart, and covered with about one inch of soil. Some growers drill an early maturing variety of radish over the asparagus to mark the rows. The asparagus seed requires from four to six weeks to germinate, so that the radishes do not interfere in the least with the asparagus plants. The asparagus nursery should be given clean tillage during the entire summer. Some growers prefer lifting the plants in the fall, choosing only the strongest for planting in the permanent plantation. If the ground is prepared early in the spring, the plants need not be lifted until planting begins, but the safer course is to take the plants up in the fall and store them in a cool, moist cellar or pit. Experiments at the Pennsylvania State College indicate that too much care cannot be exercised in the selection and planting of asparagus roots. This is one of the main arguments for growing your own plants. If the plants are purchased at about four dollars per thousand, it is not likely that many will be discarded, while if grown at home and there is a surplus of several thousand, the grower does not hesitate to select the strongest. It is important that thinning be practiced in the nursery with a view to growing the best plans. This should be done when the plants are about two inches high and they should be thinned to an inch or two inches apart.

In speaking of seed selection it is just as important to have plants with a few eyes selected for setting in the permanent plantation. The market demands large shoots and the tendency of the plants of few eyes is to continue to produce large shoots during the life of the plantation. The importance of seed selection and plant selection cannot be overestimated.

Preparation for field planting should begin in the fall. Asparagus makes the best growth in soils abounding in vegetable matter. This means that manure should be used with the greatest freedom and if clover sods are available, they should help materially in the starting of the plantation. Land of any kind which is to be planted with this crop should be heavily manured and plowed in the fall, repeating the operation and adding more manure the following spring. The plowing should be as deep as possible, although care should be exercised to avoid turning up too much of the subsoil if of a clay composition. Disk and cutaway harrows may be used to good advantage in the preparation of the soil. Effort should be made to secure a fine bed to the full depth of the plow furrow with all vegetable matter thoroughly incorporated with the soil.

Practice varies widely with regard to planting distances. A common plan in New Jersey and in other sections where white grass is grown is to set the crowns about two feet apart in rows from five to six feet apart. This provides ample soil for blanching. If green grass is desired, the rows may be very much closer. One of the most successful growers in the state, R. H. Garrahan, Kingston, Pa., plants two by four. Occasionally a grower is found who prefers the check system. For example, Hon. Thos. W. Barlow, of Philadelphia, Pa., who has twenty-five acres, plants four by four. He claims that by this system much hand labor is avoided and that the shoots are larger. The old method was to set the roots at a great depth, often twelve to fifteen inches. Deep planting is often practiced to some extent but many growers can see no advantage in planting at extreme depths. The depth should be determined by the character of the soil. If the purpose is to grow white grass and the soil is of a sandy character, then the crowns may be planted at a greater depth and ten to twelve inches under satisfactory conditions would not be too much. If on the other hand the soil is clayey, deep planting would be a disadvantage. It is probably never desirable to set the crown in the sub-soil. This means that in most of our Pennsylvania soils the roots would seldom be more then seven or eight inches below the surface of the ground. Practically all of the soil in the furrows may be removed by means of a plow, so that little shoveling is required in preparation for planting. The roots should be kept moist and plump and not more than two inches of soil should be placed over the crown at the time of planting unless the soil is sandy or of an extremely porous character. Soil should be drawn up to the plants from time to time as the plants grow and if strong, vigorous roots are planted only a few weeks time will be required until the field is practically level. It is important to give the field clean tillage during the entire season. No weeds should be allowed to grow and soil moisture should be conserved by

stirring the soil with tools which are best adapted to the prevailing soil conditions.

In beds which are more than two years old, tillage should begin just as soon as the ground is dry enough in the spring. Soil in young plantations may be plowed while in older beds a disk or spring tooth harrow can be used to advantage even if a few plants are displaced. The destruction of a few old crowns may often be an advantage. Before plowing or harrowing, stable manure should be applied and a good grade of commercial fertilizer should be added at the rate of not less than one ton per acre. Some very successful New Jersey growers apply annually two or more tons of fertilizer per acre and it is important that the fertilizer run high in nitrogen. A fertilizer analyzing four per cent. nitrogen, eight per cent. phosphoric acid and ten per cent. potash should give good results upon most soils.

There has been much discussion as to the proper time for the application of manures and fertilizer upon asparagus fields. The probabilities are that it pays to divide the applications using part in the spring before tillage begins and part in the summer immediately after cutting. If all the manure and half of the commercial fertilizer were applied in the spring and the other half of the fertilizer used at the close of the cutting season, ideal conditions should be furnished for the growth of the plantation. The disk or spading harrow can again be used to good advantage at the close of the cutting season. Various tools as riding cultivators, narrow spring-tooth cultivators, spike-tooth harrows and Planet Junior tools are used in cultivating this crop. Cutting should begin as soon as the shoots are large enough in the spring. The diameter and length of bunches varies with different markets and the grower should aim to meet market conditions whatever they may be. In bunching, Erie County growers use rubber bands, many other growers prefer blue or red tape, while others prefer raffia and various kinds of cords. The rubber band is preferred by some because of the rapidity with which they may be placed on bunches. Colored tapes attract attention and are probably valuable on some markets in securing higher prices. There should be no cutting the first two years and the third year it is best to stop cutting several weeks sooner than usual so that the plants will not be weakened. Full cuttings may be made from the third year on, and it is important to remove everything of proper height at each cutting even if some shoots are too small to be sold. These unmarketable shoots may be left on the ground. It is seldom that asparagus is cut for market after the first of July.

The common asparagus beetle is about the only insect enemy that gives any trouble. It should be combated on young plants by arsenate of lead and on old plants after the close of the cutting season, using the same poison. When this insect appears upon the young shoots in sufficient numbers to cause injury, air slaked lime can often be used to advantage. Rust is the only asparagus disease of any importance. Although various spraying materials have been tried, they do not seem to be effective in controlling rust. Precaution should be taken to avoid rust, by selecting seed of plants from plantations which are known to be free. The tops upon all plan-

tations should be mown and burned in the fall of the year. This work should be attended to before the leaves are dry, so they will not shake from the plants and thus spread disease germs which would cause trouble next year.

Mr. Fenstermaker.—When do you spray with the lead?

Prof. Watts.—You cannot get away from spraying to save your life, can you? Whenever the enemy appears; any time you see him, get your gun out.

A Member.—How far apart do you usually have the older beds planted?

Prof. Watts.—Rows 4 to 6 feet, and the plants set 2 feet apart in the row.

Mr. Case.—What fertilizer do you use?

Prof. Watts.—4-8-10 fertilizer. We put it on in the spring of the year; then again in the fall; I would suggest that you use no less than one ton—or even two tons; some of the best growers use $75 worth of fertilizer per acre, and get $400 to $500 worth of asparagus from it.

A Member.—Do you recommend applying manure in the fall?

Prof. Watts.—I would say half in the spring and half in the fall; I would apply it at the end of the season and then work it in.

A Member.—Will black muck soil do in place of manure?

Prof. Watts.—I don't think it would do very much good.

Mr. Walton.—How do you work the manure into the ground?

Prof. Watts.—With any implement that will get it in the ground. I prefer the disk harrow. In New Jersey I think they use the cutaway harrow; don't they, Mr. Roberts?

Mr. Roberts.—The Randall Harrow, and the Spading Harrow.

Prof. Surface.—Will seeds from rusted plants produce rust?

Prof. Watts.—I think they will, but I am not sure; how about it, Prof. Waite?

Prof. Waite.—I have never worked at it.

Prof. Watts.—How about it, Mr. Garrahan?

Mr. Garrahan.—I would not use them.

A Member.—How about planting asparagus in the apple orchard?

Prof. Watts.—I don't know; I would not do it; I don't believe it would work; do you, Mr. Hiester?

The President.—I certainly would not, because after your trees get about fourteen years old, the roots interlock, and what you gain on one you lose on the other. You want to raise two crops, but raise them one after the other, not one on top of the other.

Mr. Engle.—You cut everything, and don't leave any shoots on the ground?

Prof. Watts.—Cut everything, and don't leave anything on the ground.

I would like to have Mr. Garrahan speak to us on the subject of marketing.

Mr. Garrahan.—I don't know that I have anything to say in regard to the question of marketing. Our conditions at Wilkes-Barre are very similar to those of Prof. Watts at State College. The trade is not very critical, consequently we do not grade the asparagus, but sell it just as it comes. Our method of cutting is to use butcher knives, and keep the knife about one inch below the surface of the ground; the shoots are then carried to the end of the row in a basket, laid cross-wise, and hauled to the bunching shanty. There the asparagus is laid on the table, and put in the bunching machine. We use what is known as the Philadelphia Buncher; it is an iron machine, and makes the bunches uniform. We use little Polish girls for this work, and pay them 50 cents a day; they get quite expert at getting the ends in evenly; after being bunched they are tied; for this purpose we use a three ply Jute; it doesn't look nice, but our trade isn't critical.

Mr. Engle.—Do you ever tie with Raffia?

Mr. Garrahan.—No.

Mr. Engle.—Do you aim to have all your asparagus the same length, and what length?

Mr. Garrahan.—About 8 inches.

Mr. Engle.—Do you cut it on Sunday?

Mr. Garrahan.—No; we cut on Friday, and on Saturday; we cut very close on Saturday morning, and then sell up to six or seven o'clock on Saturday evening. Then we go over the ground with a two-horse cultivator on Saturday afternoon, and turn some dirt over the rows. This covering destroys some weeds. Then we usually go over it with a disk attachment on the next Saturday, and un-

cover the rows slightly, and by that method we prevent Sunday work to a great extent and keep the weeds down. When we got through with our crop this year I don't think there was a weed in the field. I have seen other fields that were simply covered with weeds.

A Member.—Do you run the disk harrow over the rows during cutting time?

Mr. Garrahan.—No; we put disks on the riding harrow and run shallow during cutting time. It is disked thoroughly in the spring.

Mr. Case.—How deep is that asparagus set?

Mr. Garrahan.—About six or seven inches.

Mr. Case.—Does not the disk strike the crowns?

Mr. Garrahan.—No, it doesn't seem to. After cutting for the season is done we are sometimes troubled with weeds a little bit, but throwing the dirt over them every week seems to smother them pretty well.

Mr. Case.—Do you ever use the asparagus chisel?

Mr. Garrahan.—No; we use a butcher knife with a rather wide blade—about an inch and a quarter wide—and a round edge.

Mr. Engle.—You speak of bunching with the Philadelphia Buncher; does that give a uniform thickness and evenness, regardless of length? I have seen them in the Philadelphia market all sorts of lengths, so there appears to be no standard.

Mr. Garrahan.—No; there is no standard length; the long bunches probably appeared at a time when it grew very rapidly. Sometimes on a Monday morning we have grass a foot long, and then we cut off the seedy tops before bunching.

Mr. Smythe.—When do you stop cutting?

Prof. Watts.—We stop cutting about the Fourth of July.

Prof. Waite.—What age are your plants; how soon do you begin to cut?

Mr. Garrahan.—About the third year.

Prof. Waite.—How much of a crop the third year?

Mr. Garrahan.—About half.

Prof. Waite.—That is, you put out the beds and tend them for two years, and then you begin to cut?

Mr. Garrahan.—Yes; in fact, we get a little the second year. It is not advisable, however.

A Member.—Do you plant one or two-year-old roots?

Mr. Garrahan.—One year old.

Mr. Walton.—Do you irrigate?

Mr. Garrahan.—No; if you could use the Skinner system that would be all right, but with our system we would fill the ground with water, and that is too much for asparagus.

Mr. Walton.—You irrigate on the surface?

Mr. Garrahan.—Yes, sir.

Mr. Walton.—We use the Skinner system; you think it all right for asparagus?

Mr. Garrahan.—I think so: Prof. Watts knows more about it than I do. You consider it all right, Professor?

Prof. Watts.—I think so.

Mr. Walton.—Asparagus needs considerable moisture, doesn't it?

Mr. Garrahan.—Yes.

A Member.—How long do the roots grow?

Mr. Garrahan.—About two feet, I think.

Prof. Watts.—We have the Hagerstown Clay Loam, and in our soil the roots go down about 10 inches. I believe that in certain kinds of soil they would have a tendency to go down quite deep. One of the Philadelphia growers, Mr. Lippencott, found them to go down very deep because his water table was down very deep.

Prof. Waite.—In the Sacramento Valley, California, they do not need to irrigate, because the water table lies so near the surface, and yet the roots go down very deep there.

Mr. Garrahan.—One more point: in washing we are careful not to get the tips wet as that would cause rot. We wash the bottom of the bunches and set it upright in the water for a few hours, and then it is packed in crates for shipment.

Prof. Waite.—You don't wash it at all for long shipment, do you?

Mr. Garrahan.—No, sir.

The President.—Mr. Garrahan has told us about the Pennsylvania local market; now I would like to have Mr. Roberts tell us something about the New Jersey markets, and the general market.

Mr. Roberts.—Mr. President, I don't want to take up too much of your time; the asparagus has always been a pet of mine. It has enabled me to plant my orchards. I prefer the Palmetto asparagus. I got my seed from Ridgeway of Mullica Hill, N. J., for $5 a pound. He also grows plants. I had an expert from Washington up with me this spring, and he told me I had planted a variety of Palmetto that was rust resistant because of the bloom on it. We plant 6 ft. apart; some of our best growers plant them farther apart than that. It is only a quesion of time when it gets too thick. We were growing other varieties when the rust attacked them, and we had great trouble in getting a rust-resisting variety, which we finally seemed to find in this strain of the Palmetto. We go to the general market in Philadelphia, and in place of the jute or raffia, we use a red ribbon to tie the bunches; it attracts attention. Little points like this attract attention, which is what is needed in our business.

A Member.—Will that ribbon run when it gets wet?

Mr. Roberts.—We had a little trouble with this at first, but this last year we succeeded in finding a ribbon that does not run. It is only cotton, but the bunches of asparagus look very pretty tied up with it.

We do not use many cover crops, but those we do use, we want to get in early. This last year we used cow peas; I am sorry that I did not use rye with them.

Mr. Smythe.—Would not barley answer better; it is very good?

Mr. Roberts.—Yes, it may be; I have never tried it. Rye is excellent, I know, and we want to work it in very early in the spring; crimson clover is also good, but we have to get our cover crops worked in very early in the spring.

The Secretary.—Do you get a good growth of cow peas?

Mr. Roberts.—Yes; with just a little rye in, they are a great success.

The President.—We will now take up the next subject on the program—an address by Prof. H. F. Tompson, of Amherst, Mass., on "Intensive Gardening Methods in Massachusetts."

INTENSIVE MARKET GARDENING IN MASSACHUSETTS.

By Prof. H. F. Tompson, *Amherst, Mass.*

Mr. President and Members of the Pennsylvania Horticultural Society: I have wondered how much there is of interest to the Pennsylvania market gardener in the consideration of methods used in Massachusetts. Your Secretary gave me my subject, so I am free to talk about any or all phases of the subject.

I had occasion last fall to look over statistics in regard to the vegetable gardening of the country. I found that more than $7,000,000 worth of vegetables were sold in New York State in 1899, according to the U. S. census taken that year. This placed New York State first on the list of vegetable producing states. New Jersey ranked second; Pennsylvania third, and Massachusetts sixth.

It is interesting to note the corelation between money value of vegetable products and the population of the states in question. New York, far in the lead in population, stood first in production of vegetable crops. Pennsylvania, standing third on the basis of population, also stood third in vegetable production with a valuation of these products of about $4,000,000, and Massachusetts ranking sixth in vegetable products, ranks sixth in population.

Queens County, N. Y., and Middlesex County, Mass., were, at the time of the census, the leading counties in vegetable production of the United States.

Figuring on the basis of acreage, Middlesex County is the most intensive vegetable producing centre of the United tates. This fact gives the Massachusetts man a chance to boast a little, if he chooses. The high rank that Middlesex County takes in intensive production is accounted for by the extent of the greenhouse industry carried on in the vicinity of Boston. The towns of Arlington and Belmont, located side by side, both near Boston, are known as "Greenhouse towns," and it is here that the growing of head lettuce under glass, is most highly developed. It is also a fact that the outdoor market gardening is very highly developed throughout the territory adjacent to Boston.

Most of the market gardens in Massachusetts are located in the eastern third of the State. I think I am correct in saying that we have more cities of 30,000 or over, in eastern Massachusetts than in any other equal area of the country, and this gives us a splendid market—one of the best in the world.

Many of the market gardeners are working the same land, which had been used for market gardening purposes by their fathers and grandfathers, and the city has grown out to them. In many instances, and within the past twenty-five years, the price of real estate has caused the sale of the market gardens for building sites; but many of the gardens are now producing vegetables on land worth from $1,000 to $5,000 per acre. This is not land on which the ordinary man can afford to raise vegetables. The average extent of a Massachusetts market garden is probably about twenty-five acres, though I have not been able to obtain authorative figures

about this. We have gardeners who are intensively working as many as 150 acres, but as a rule the men who have limited themselves to much smaller areas and worked them more intensively are those who have been extremely successful.

The market garden crops of Massachusetts are many and it is impossible to name the leading crop, unless we refer to the greenhouse industry, and that would be fairly difficult. Ten years ago there would have been no question as to the leading greenhouse crop, as lettuce production far outranked all others. To-day the amount of lettuce raised is as great, probably greater, but the southern competition has taken away much of the "fun."

Cucumbers rank close to lettuce in importance for a glass house crop. There are localities in the state which specialize to a degree. Danvers was for years noted for its onion and carrots, which fact is indicated by the standard varieties bearing the name of the town. At the present time this locality is not a large producer.

The historic town of Concord is the New England centre for asparagus, and large acreage is devoted to this crop. Here is established a co-operative Experiment Station, and the State Experiment Station, the U. S. Department of Agriculture and the growers are carrying on much useful work in improving methods of production, studying insect and disease control, fertilization, seed selection, etc. Rhubarb is also extensively grown, both in the field and inside for winter forcing.

The selling end of the business presents the same problem in Massachusetts as elsewhere. The market gardeners within a radius of twenty-five miles of Boston usually cart their produce to the Boston markets, where it is sold, either directly from the wagons or by the commission man. The first named method is the more popular. It is frequently the case that our towns receive a very inadequate supply of fresh vegetables from the local growers, and are compelled to send to Boston for their supply. In fact, if properly developed, some of these towns would afford a much better market than is secured by some of the small growers who market their crops in Boston. Town after town may be found in the western part of the State where the supply of vegetables is shipped from 30 to 100 miles by rail to supply the local demand, which could and should be supplied by the local grower.

A most important factor, or one generally so considered, is the soil in relation to the crops produced. Massachusetts soil is of glacial origin and the variety is unlimited. One can often find a range from a light sand or gravel to a heavy muck within a stone's throw. Much of our market garden land now classed as the best, is of a very light sandy character, and naturally very poor in production capacity. This is the type of soil largely found in Arlington and Belmont. A mechanical analysis of this soil shows about 75 per cent. of sand, the residue being humus, silt and clay. This Arlington and Belmont soil, naturally light in color, is now black, due to the large amount of humus supplied by stable manure, which is very freely used. The market gardeners of Massachusetts depend almost entirely upon stable manure for their supply of plant food. This is contracted for, or bought by the cord, from livery stables.

A cord of stable manure is measured as is a cord of wood, and varies in weight from 1½ to 2½ tons. Prices paid vary greatly, the price depending upon many factors. Probably $4.00 per cord is an average price for manure delivered. Few gardeners use less than ten to fifteen cords per acre, and many more use from twenty-five to forty cords per acre, for a season. The highest named amounts have proved extremely profitable where a sufficient amount of moisture is obtainable, or when the manure is well decayed before application.

The important factors in the success of Massachusetts market gardeners are: (1) high fertility, (2) thorough tillage, and (3) continuous cropping, the last of which includes both companion and successive cropping throughout the season.

The methods of handling the manure, the main source, in fact, almost the only source of fertility, are important. The large gardeners obtain most of their manure supply from city stables, and many of them keep one or two teams hauling the same nearly every day throughout the year. It is the custom to pile this and work it over frequently, to prevent "fire-fanging," and to get the manure into fine condition, with the ammonia compounds made available by decomposition. Much shrinkage takes place and more or less nitrogen is lost by this method of handling. Probably the most economical way to handle the manure is the immediate application to the land, upon hauling to the farm.

The manure is usually spread by hand. The objection to the use of a machine is that only small applications can be made at one time. Without question, the value of manure is greatly increased by the pulverization it receives when spread from a machine. A machine also insures even distribution, and as the object of the market gardener, or any tiller of the soil is to get the maximum crop of the best quality, the soil needs a uniform treatment. A manure spreader insures a uniform amount of plant food to all the crop.

A very limited use of commercial fertilizers is made by Massachusetts market gardeners. As before stated manure from livery stables forms the chief source of plant food. Where this can be bought cheaply, its use in large amounts is more profitable than any substitute. We need to recognize, though, that stable manure is not a balanced plant food, and that plants need a balanced ration, as much as live stock.

Contrary to what might be expected, the commercial fertilizer most used is nitrate of soda, a compound containing nitrogen in soluble form, the same plant food element which is most abundant in stable manure. Nitrate of soda has proven very useful when carefully used on certain crops, and commercial fertilizers will doubtless be increasingly used by market gardeners. The question of tillage needs and receives much emphasis among us.

Doubtless you have heard the story of Jethro Tull, who three centuries ago advanced the theory that plants took in through their roots, particles of soil for food. And he proved his theory by his practice of very thorough cultivation. While his neighbors' gardens did only moderately well, or were a failure, his flourished and

made its owner proud. He made it his practice to thoroughly cultivate, whereby he made his garden retain the soil moisture, made it warmer, and caused more plant food to become available. Constant and thorough cultivation is as essential as good seed.

Some of the tools made use of in Massachusetts are the double action, Acme and Meeker harrows, which make a trio of soil fillers to follow the plow that cannot be excelled. Each man must select tools adapted to his soil, but there are some tools that are standbys, and those named are such.

It is not unusual, on some Massachusetts gardens, to see, following the plow, a gang of six men, hand-raking the land, making the soil smooth and fine in beds from six to eight feet wide, with a dead furrow between. This method is used in preparing the land for early lettuce, spinach, radish, and other crops which are close planted, and particularly profitable for the early market.

The maintenance tillage problem has been carefully worked out with the following points in mind: Moisture conservation, weed destruction and soil areation. On the most successful gardens, horse and hand cultivators are kept constantly at work. The adaptation of particular tools to particular soil conditions is also studied, and one may often find tools in use which have been invented by the "boss."

Double cropping is a common practice with us. Whether this practice is desirable must depend upon the crops raised and the skill and judgment of the grower. Double cropping is usually considered under two divisions: (1) Companion cropping, and (2) Successive cropping. The latter is the more desirable practice.

The market gardener of experience does not suffer from barren land. Sometimes the question is asked: "Is there not a waste in excessive feeding?" but this chief argument against successive cropping, founded upon the theory of "food exhaustion," is not a difficult one to answer.

We have a more questionable practice to consider in Companion Cropping. Growing two crops on the same land at the same time may be made profitable but often is not. Here the skill of the grower is tested to the full. I have seen the following companion crops growing in Massachusetts: Spinach between cabbages; cauliflower and corn and lettuce grown the same way. Onions from seed, and sets between celery; tomatoes and early sweet corn; bush beans between pole beans; late cauliflower between early beans, etc. Important points to consider in planning for companion cropping are: (1) The adaptability of soil, (2) fertilization, and (3) tillage to the two crops under consideration. Other points to consider are—respective dates of harvesting, root systems, possibility of injury to one by the other from shading or disease, insect pests and their control.

For instance, while spraying the cabbage crop with arsenate of lead to kill the cabbage worm would be permissable, such a spray for lettuce, which might be grown between the cabbages, would be out of the question.

The matter cannot be settled definitely for all. There are schemes for companion cropping that are desirable and profitable, and the opposite is also true.

Another problem which interests our gardeners is the intenseness of cropping allowable—that is to say—can he afford to plant his rows of beets 10 inches apart instead of 14 inches, and have his beets 3½ inches apart in the row, instead of 4 inches. Can he afford to grow celery 4 inches apart in the row, or should he allow 6 inches? Is it more profitable to plant sweet corn 6 inches or 9 inches or 12 inches apart in a row, or in hills with three or four stalks to the hill?

Such work is being carried on in an experimental way. We know this much: The problem varies so with the management given the land and crop that we each must be our own experiment station director and carefully plan and watch. Results in the shape of a better understanding of our work, always come. Everywhere the market gardener must approach the business methods of the manufacturer to attain his greatest success. Better business methods will ensure such success as will surprise many who now say: "Impossible, impossible."

Mr. Garahan.—Would you advise companion cropping on heavy clay land?

Prof. Tompson.—Yes; I think it is better on heavy land. The sandy land would be liable to dry out.

Mr. Garrahan.—Is there any danger in walking over that heavy land, of tramping it down so hard that the second crop suffers, or can that be overcome by cultivation?

Prof. Tompson.—I am not sure, but think you could so arrange your companion crops that you would secure good results. You might use spinach and cabbage. They both do well on heavy land; they could be hand cultivated. You could grow cauliflower and cabbage, or tomatoes. There would be no more work in caring for the two crops, than for one.

Mr. Garrahan.—It is not the work, but the damage one might do in tramping down the land that I speak of.

The Secretary.—How about horse-radish and cabbage?

Prof. Tompson.—I have seen them grown together very successfully; a crop of early cabbage put in, and the roots between horse-radish demands lots of nitrogen and cabbage lots of phosphoric acid.

Mr. Garrahan.—Do the market gardeners at Boston discriminate against shaving manure?

Prof. Tompson.—Yes, they do. Some of them are using it, but most of them are not—particularly that with pine shavings.

Prof. Surface.—I would life to ask if they consider the street sweepings to be worth anything?

Prof. Tompson.—I have seen one man using it; he pays 50 cents a load.

Mr. Hull.—Is the close planting of celery a success?

Prof. Tompson.—Yes; except for the air space.

Mr. Garrahan.—Is there demand for any other early celery than the Paris Golden?

Prof. Tompson.—The Boston market likes the Paris Golden best for early. Most of the growers grow Pascal as well. Some Boston Market is also grown.

Mr. Garrahan.—Could you tell me the cost of putting away about one acre of celery?

Prof. Tompson.—I could not. The boards would cost a good deal unless you have them on hand. Each plant takes about three inches. They place the roots about three inches apart, and then throw soil over them. I don't know, but I judge it would run somewhere between $50 and $75.

A Member.—What success do you have in growing pie plant in your state in winter?

Prof. Tompson.—The forcing of rhubarb is carried on most extensively in the town of Concord, where they grow much rhubarb and asparagus. They raise their own roots and have them at least four years old. At the meeting of Market Gardeners' at Ashtabula, Ohio, one of the Ohio professors said that one year old roots were best for forcing, and he had photographs of some very fine one year old roots there.

I might say in regard to asparagus, that our growers in Concord follow the example of New Jersey growers and grade their asparagus roots. There is no regular standard, but they divide into three grades—Extras, Firsts and Seconds. For bunching, they use a round table, with a movable top, they have boys to trim it to the right lengths—about seven or eight inches long; then it is tied with raffia and packed and sold in bushel boxes. They do not use any companion crop with asparagus; they claim it needs all their time and attention, as well as all the land. The first year or two it might be companion cropped successfully.

Mr. Garrahan.—I don't use any companion crop either with asparagus. We very often follow one crop with another.

The President.—The late R. F. Schwarz, of Analomink, was one of the most systematic, as well as one of the most successful market gardeners in eastern Pennsylvania. We will now have Mr. Arny, of Philadelphia, who spent some time there, tell us something of the methods used on that farm. Mr. Arny is now a Senior at State College.

MARKET GARDENING ON THE FARM OF THE LATE R. F. SCHWARZ, ANALOMINK, PA.

By L. W. Arny.

The farm and conditions found at Analomink, were by no means ideal, as that term is now used by the market gardener, but they were so clearly an example of what the possibilities are under extreme adverse circumstances, that we can learn many lessons from them.

Before taking up the actual farm practice, of Mr. Schwarz, it is well to look into the history of his farm to note how greatly he was handicapped from the beginning, and how he overcame the most of his difficulties and turned them into successes.

Mr. Schwarz was born in Berlin, Germany, and after graduating from a local school, entered the University of Heidelberg, where he completed his education. In his early manhood he moved his residence to America, in order to escape the laws of the German army. Having no business training, Mr. Schwarz engaged in the employ of a Chicago business house in the capacity of travelling salesman, in which business he was not only successful in his work, but made many friends throughout the country. After having travelled for some few years in this business, Mr. Schwarz found his health breaking, so that he was forced to resign from his position and consult a physician. Then he learned that he suffered from tuberculosis, and that specialists gave him but a few years to live. Having heard that the region around the Water Gap and Pocono Mountains in Monroe County was particularly favorable to lung troubles, he decided to buy a home there, for reasons, as he expressed it, "To provide a home for his wife, and to find a good place to die in."

This home was the beginning of the recent "Schwarz Farm," and consisted of a small two-story house, with a small garden in the rear, probably being not over 100 feet by 50 feet. At the advice of his physicians, Mr. Schwarz spent most of his time out of doors—at first, by simply taking long walks in the surrounding country, and then, later, by becoming interested in flowers, and planting and caring for these. He knew absolutely nothing of flowers, plants of any kind, or of the natural sciences governing their growth and care, but this deficiency was slowly made complete by a great amount of reading—the reading of reliable works relating to floriculture, horticulture, and all bulletins bearing on these subjects. This new work proved so absorbing and so full of promise, that Mr. Schwarz decided to try it on his land, and if the bright prospects continued, to go into it commercially, and make it his life's work, or

to make it fill the remaining part of his life, which he then suposed to be but a short while.

The house stood some 50 feet back from Brodhead Creek, a small mountain stream winding through this part of the country, on almost level land with the main line of the D. L. & W. Railroad, running at the rear of his lot about 200 yards away. The soil, not only in the small garden, but on the surrounding land, was almost pure sand, with a great deal of loose stone, having been washed down from the mountain during the flood times of the stream.

Mr. Schwarz's first market garden efforts were with pole beans, but they did not thrive in the pure sand of his garden, and were the cause of some disappointment and discouragement. But by the time the failure came he had acquired enough agricultural knowledge to know that his land must be given body and more fertility before it could be made to give him success in market garden work. This was a phase of the work that had not occurred to him before, and the greatness of the task of building up any amount of that land, seemed such a barrier that future profits would be long coming if they came at all. But he was firmly convinced that market gardening could be made extremely lucrative if properly managed, and so set out to make his land fertile. This work was started by hauling away tons of muck from a swamp distant some two miles, and thoroughly incorporating this into the sand of the farm. This made a soil dark in color, friable, and with perfect drainage,—an almost ideal soil for market garden work. An area of about seventeen acres was treated in this manner, giving a perfectly level area of excellent soil. Then crops thrived to perfection, the only limitations being Mr. Schwarz's knowledge to perfect a suitable rotation of crops and a rational system of fertility maintenance.

Another question of equal importance, and demanding as prompt solution, was that of markets. Should the produce be sold directly at retail, or should it be handled through commission men? The latter course seemed the wiser because of its greater simplicity, but it afterwards proved discouraging. This was probably due in part to the fact that the selection of commission merchant had been unfortunate. The one chosen was unscrupulous, and returned to Mr. Schwarz an exceedingly small amount of money, on the ground that the goods had been damaged in transportation.

Having been thus discouraged with commission business, Mr. Schwarz decided to handle his produce directly to the large summer hotels of Stroudsburg and the Water Gap. This scheme not only promised greater financial returns, but also simplified the management of his place in that that particular trade did not demand the exceedingly early produce that most markets want, and hence it reduced the amount of glass on the farm to almost a minimum. Two greenhouses were constructed, each 20 ft. by 60 ft., in which were started tomato and cabbage seedlings for the early crop, together with some few flowering plants, particularly pansies, which were used as a side line.

The question of the maintenance of fertility was at first solved by using cover crops of crimson clover, and complete commercial fertilizers, but two serious objections were found to clover: first,

it did not do well on the land; and second, the crops were not off the land at the time when it should be sown. Here followed a period of experimentation with cover crops, practically every available legume being tried, alone, and in combination with other grasses, the result being that a combination was effected which had more to do than any other one thing, with the success of the farm. This was the using of rye and vetch as a cover crop and nitrogen restorer. This combination was tried at first experimentally, until it proved its value, after which Mr. Schwarz became its champion—built his own farm up on it and preached it to his friends and neighbors. The success of this rye and vetch combination was due to several things: first, rye and vetch are plants that require no particular fertility of land upon which to grow; they will thrive where crimson clover will give but a poor stand, the vetch is a member of the legume family, and its properties of nitrogen gathering are as great as that of the clovers; and, lastly, both may be sown late in the season, at a time when crimson clover would be unable to get a start. The combination was found to be better than the vetch alone, since the rye acted as a nurse crop and assured the stand. After this cover crop had proven its value, the entire area of eighteen acres was sown to it in the fall, as late as September first to the fifteenth. The stand was luxuriant, protecting the land from any erosion during the winter, and providing a large amount of green manure to be plowed under in the spring.

From this period on, very little change was made in the management of the farm. The cover crops were sown late, and plowed under in the early spring, just as soon as it was safe to operate on the land. Every third year a solution of the soil was examined for acidity, and when enough acid was present, a medium application of lime was made over all but two or three acres. If the land was violently acid, this small area was planted in early potatoes. This system of having potatoes planted in slightly acid soil proved extremely satisfactory—giving yields of 250 to 275 bushels per acre, on the average.

Every spring the farm was given an application of commercial fertilizer, varying each time in its proportions, but always being low in nitrogen—sometimes 2-8-10, and averaging from 200 to 250, and often 300 pounds per acre. The reason for this small application of nitrogen, was the fact that there already was some in the soil from the vetch, and the remainder was better applied immediately before planting in the form of $NaNO_3$, hence making the nitrogen at once available.

The cabbage, lettuce and tomato plants were started in the greenhouse in time to set out as soon as the ground was fit, when the other crops, potatoes, peas, beans, onions, carrots, beets, peppers, rutabegas, parsley, radishes, turnips, cucumbers and squash, were planted. Some varieties of these crops were unknown, but some of the most valued were: Radishes, French Breakfast and Crystal; Potatoes, Early Ohio and Carmen No. 3; Peas, Telephone; Beans, Bush-pole, Limas and Wax; Onions, White Globe and Egyptian; Carrots, Danvers; Beets, Eclipse and Egyptian; Cucumbers, White Spine; Tomatoes, an unknown variety—Earliana, Matchless, Globe;

Cabbage, Danish Ball Head; Cauliflower, Snowball; Lettuce, Boston Market. These varieties made up the main crop, but in addition there were other varieties of different crops grown, which were unknown, and at the same time valuable. The seed for these was gotten from a friend in the New England States.

The original piece of land—that small plot forming the yard of his house, was used as a seed bed for lettuce and late celery. The celery mostly grown was White Plume and Giant Pascal. This plot proved very successful for this work, in that it had been longer worked than the rest of the land; had been intelligently worked, and was in a high state of fertility. Several small plots were devoted to radishes, and this being a short crop, soon released the land, after which it was planted to spinach, although some difficulty was experienced in getting a good, uniform stand at that time in the season. Peas were planted in rows three feet apart, and trained on brush stuck into the ground. When the harvesting of the peas was no longer profitable, the brush was pulled and piled in several heaps and burned, the ashes and pea vines being then plowed under. That plot was next given an application of $NaNO_3$, about 150 pounds per acre, and winter celery then set. Where early crops could be gotten out of the way, late cabbage was set, first being encouraged by a light application of nitrate of soda, and this, in turn, was harvested, and winter celery set out. In only one case was there any intercropping practiced, and that was in a small patch of sweet corn, in which squash was planted, the policy being to keep everything separate, to crowd to the limit, and force by abundance of plant food, especially nitrogen. A cultivator was always at work, each plot being cultivated at least once a week, up to the time when the crop was large enough to be injured by the passing of the horse and machine.

Water began to be a serious problem on the farm, for, while Brodhead Creek was convenient, and a powerful windmill had been erected to pump the water, there were certain seasons in the year when the supply was limited, and it was usually at seasons when the water was needed most. This difficulty was overcome by building a dam some two miles distant in the mountains, and piping from there. From this main pipe, laterals were run into the main fields, and in dry weather, the water was allowed to run slowly all night, making for itself rude irrigation ditches, and although this method of irrigation was rough and simple, results showed it sufficient to meet the demands of the case. Never did a crop suffer from drought, for the water supply was always good, and placed so that it could be had where it was most needed.

Some trouble was experienced at first by the ravages of the asparagus beetle, but this enemy was later easily controlled by sprinkling powdered lime on the plants early in the morning, while the dew was still present. The potato beetle was controlled by applications of Paris Green and lead arsenate, made whenever the insects became numerous, so that no serious loss was experienced from these pests.

After a few years of successful trade at the Water Gap and Stroudsburg, competition came in and limited the market to such

an extent that a greater outlet for the produce had to be sought. This outlet was found, but it involved a tremendous amount of extra work and expense. This market was at the big hotels toward Pocono, and although they were larger, demanded first-class produce, and were fairly numerous, it was a long and hard trip to get to them, but, as the scheme offered the only solution to the problem, three wagons and teams were gotten, and the product hauled eighteen and twenty miles over rough mountain roads. The system worked out for these wagons was this: each driver, knowing the demand for his particular trade, would put down on a provided slip, the load he would probably need for the next day. This was done after his return in the afternoon; his wagon would then be loaded according to this slip as he had made it out, backed into a shed, and was ready for the following day's business. While this system of marketing, made possible the disposal of a large amount of produce, the expense resulting from the wear and tear on the wagons and teams from such hard use, cut the profits down much below what they would ordinarily be. This was the greatest contention of the business, and one that could not be overcome, but merely reduced to a minimum.

A few years before the close of the farm's history, some twenty-seven acres of land on the opposite side of Brodhead Creek was offered for sale. This land Mr. Schwarz purchased, and although it was poor in quality, he decided to try fruit on it. The same factor of building the soil up presented itself, as was the case with the original land, but owing to its hilly character and the great expense of hauling in muck, it was simply given the treatment of rye and vetch, together with commercial fertilizers. This new land was divided into four fields, three of which were set in apples, but the choice of varieties made was unhappy, so that they never were a commercial success. They were all early summer apples, chiefly Sweet Bough and Yellow Transparent, for which there was such a limited demand that the possible prices would not pay for the proper treatment of the orchard; hence the result was that the land was given over to sweet corn and the apples ignored, except to pick the most perfect specimens and sell them to the best advantage. For the corn, the land was treated with rye and vetch, up to a point where it was in fairly good condition, and then crimson clover was used. This crop worked just as well since late sowing was not the important factor here that it was on the old land. The fourth field of the newer land was planted in cherries, pears and raspberries, both black cap and red varieties, but the original land claimed so much attention that all of these newer fields were more or less neglected, so that the maximum returns were not gotten. Although this was probably bad management, it was due to the fact that the original land was the part of the farm that was making the money—that the new area was far inferior in fertility, that this section was nearer population, and being remote from the main part of the farm, much theft had to be contended with, and, lastly, that Mr. Schwarz felt that his remaining years were numbered, and the process of making his new land rich was too long a one for him to undertake.

There were many little points in the management of the place that were original, and, while being small in themselves, added greatly to the success of the farm. For instance, in the plowing under of any crops, such as cover crops or pea vines, instead of simply running through with a plow, as is most often done, the disc harrow was first used. This broke up the material into finer parts, making further plowing easier, and insuring a quicker decomposition of the material. This harrowing was followed by a plow, when the operation was easy, quick and more efficient. The plow was followed by the dics, after which the fertilizer application was made. Then a smoothing harrow was used, followed by a marker, after which the crop was set. A cultivator was used after that as often and as long as possible. When seedlings were set in the field, the ordinary round dibber was never allowed to be used. In its place a flat dibber or a trowel was employed. The theory of this was that the ordinary farm hand would make a far deeper hole than was necessary, and with the round dibber this would result in an open space between the roots of the plants and the bottom of the hole, and that more than ordinary care in closing was required to prevent this, while with the flat dibber, the hole would probably be just as deep, but it would be more evenly closed, and even in a case where it remained, it would be so narrow that the plant roots would have but little trouble in spanning it, and hence the supply of moisture would not be disturbed.

In the setting out of young celery plants, the tops were removed, leaving only the young central leaf. This was enough to carry on the work of the young plant and give the roots a chance to become thoroughly fixed in the soil before being called upon for active work. It often happened that soon after these celery plants were set, dry weather would set in, in which case a whel hoe was run both ways on one or both sides of the row, just as close to the plants as was possible. This gave a dust mulch, thus economizing what moisture was present and giving thorough aeration to the soil surrounding the roots. In the summer of 1909, the celery was set during a severe drought, when the soil became so dry that a total failure seemed probable. In order to save the crop, a barrel was mounted on a cart, drawn by one horse. This barrel was provided at the bottom with a twin nozzle and hose on each outlet, long enough to almost reach the ground. The barrel was filled with water at a lateral pipe line which ran into the field, and was then driven through the rows, watering two rows at a time. This procedure was somewhat slow, and required one man and two boys, but the value of the crop was at stake, and, hence, was a successful method, since it saved what would otherwise have been a severe loss.

There was one other factor which made conditions on the farm adverse, and that was the surrounding social community. That vicinity was worked by small farmers of the proverbial type, uneducated, unscientific, going by traditions, and resenting an "outsider" who came in with new and modern ideas. This state of affairs made it hard to get help of any kind and made the social life there much more unpleasant for Mr. Schwarz than it should have been.

As was stated in the beginning, this is not the history of an ideal market garden—one that should be held up as an example to beginners of what the business should be, but of one that was remarkably successful under existing conditions—one that should be pointed to as an illustration of what may result from untiring energy, firm belief and knowledge to work intelligently in spite of tremendous odds.

Notwithstanding the physicians' discouraging prediction, Mr. Schwarz lived on his farm for thirty-four years, where he finally died from heart trouble, after one of the most interesting of agricultural careers.

The President.—We are certainly indebted to our young friend for this most excellent address. He has made several things very clear to us. In the first place, when the doctor says you are going to die, don't do it, but stand on your feet as long as you can, and prove him a false prophet. Another thing, I understand Mr. Schwarz was original. No man in the horticultural business can be a copy. He must be original, and follow out his own plans. Another point is, that the market gardener and the fruit grower must be a business man. Mr. Schwarz was a business man, and applied business methods to his farm. I am sorry that we cannot devote any more time to this subject. We will now spend a little time in discussing the Lafean Apple Package and Grade Bill.

The Secretary thereupon read the following paper prepared by Mr. Edwin C. Tyson, who represented this Association at Washington, D. C., last winter, and assisted in drafting the present bill:

THE LAFEAN APPLE PACKAGE AND GRADE BILL.

Edwin C. Tyson, *Flora Dale, Pa.*

Mr. President and Members of the State Horticultural Association: You have, I think, very properly regarded the "Lafean Apple Package and Grade Bill" as of sufficient importance to justify placing it on your program. It undoubtedly deserves the careful consideration of Pennsylvania Fruit Growers.

The "Apple Package and Grade Bill" was re-introduced in the House of Representatives on the 5th inst. by the Hon. D. F. Lafean, representing the twentieth district of Pennsylvania, and was at once referred to the Committee on Agriculture.

The reintroduction was desirable because of some changes which have been made during the past summer and to eliminate some points, whose constitutionality were in doubt. These changes and eliminations were made by Mr. Geo. P. McCabe, chief solicitor of the Department of Agriculture, at the request of the committee having the matter in charge. Mr. McCabe *also* rearranged the main features of the bill with the view of placing it in harmony with the spirit of the "Pure Food" law, under the regulations of which act, it is proposed to have the provisions of the present bill administered.

After designating a "Closed Package for Apples" as one in

which the apples cannot be readily seen or inspected, the bill proceeds to specify what shall constitute a "Standard" barrel, a "Standard" box, and a "Standard" basket, for use as a "Closed Package for Apples" when entering into "Interstate and Foreign Commerce."

The "Standard" barrel is described in terms of *MINIMUM* linear dimension as follows: *length of stave,* twenty-eight and a half inches; *diameter of head,* seventeen and one-eighth inches; *distance between heads,* twenty-six inches; *external circumference at the bilge,* sixty-four inches. These dimensions are in harmony with the best practice among reputable apple growers in the United States and conform exactly with recent legislation in New York State.

The *necessity* for legislation on this point is apparent when it is stated that thousands of "Snide" barrels, if you will permit the term, have been coming to our principle markets. These barrels were made with *"short"* dimensions, *deliberately,* by the coopers to meet a demand of dishonest growers, packers, and dealers, for a cheap package. There was not necessarily any deceit on the part of the coopers, as the purchasers, for the most part, knew exactly what they were getting. They *wanted a small package* because they could save from a peck to a half bushel on every barrel, *and they got it.*

As the lowest price rules the market, and as the ordinary buyer was not able to distinguish the slight external variation in size, he naturally was willing to pay *no more* for the standard barrel than for the dishonest one, the quality of the fruit being the same.

The result was that the price which the dishonest man was *willing to take* for two and a half bushels became the price which the honest grower *had to take* for his three bushels, thus forcing the latter to practically *give away* the difference in quantity in order to sell his barrel.

This state of affairs became of such real and vital importance to the better class of New York growers that they finally passed the State law referred to above, which is working out satisfactorily. There is a suit pending in New York now, the decision of which hinges on this law, the amount involved being about twenty-five thousand dollars.

Bear in mind, however, that this New York law, does *not* prevent these "short" packages finding their way into Pennsylvania markets in competition with your fruit. Therein lies *our* interest in a National law which seeks to prevent the shipment of dishonest packages across State lines.

The "Standard" basket and the "Standard" box are both designated by this act in terms of capacity, namely, 2,342 cu. in. in each case, when measured level full, without distention of their parts.

The apple growers and handlers who were in attendance at the conference held in Washington last winter for the purpose of deciding upon the various provisions of this bill, desired to have the act designate and legalize a box and a basket of such capacity that three of them, when level full, would hold exactly enough apples to fill a barrel sufficiently to make a good tight pack when the head was forced into place, and inversely, that a barrel of apples should pack three boxes or three baskets.

It was shown by actual physical demonstration, during the conference, that three Oregon boxes of apples purchased in the open market and packed into a New York apple barrel of standard dimensions, lacked at least a half bushel of being full enough to close properly.

The *Eastern* growers in attendance affirmed that the standard N. Y. apple barrel holds three bushels, when the measure is heaped in accordance with what is the usual custom in all parts of the United States where apples and other coarse produce is sold by measure; also, that considerable inquiry over an extended territory east of the Mississippi developed the fact that a four-inch cone represents the usual amount of heaping on a Winchester bushel as practiced by the best growers and handlers; also, that by a simple calculation, this four-inch cone is shown to increase the volume of the Winchester bushel to 2,550 cu. in., which the eastern people held to be the proper capacity for a "standard" box and a "standard" basket designed to hold a bushel of apples when level full.

The western growers contended at that conference, and still insist, that the only "legal" bushel in the U. S. is the Winchester bushel of 2150.42 cu. in., and that if it is desired to legalize a "standard" bushel for apples, the proper procedure would be, to *extend the scope of the Winchester bushel* to cover that and other coarse produce. In other words that the eastern grower should overturn the practice of centuries, and compel his customers to accept a level measure of apples, stricken as is done with wheat and other small grains, instead of following the time honored custom of giving the measure a generous heaping. This, the East very properly declined to consider.

It soon became apparent, as the discussion progressed, that neither section would yield to the other and that a compromise was the only solution. It was finally proposed that inasmuch as the handlers demanded that three boxes should equal a barrel, the cubical contents of a barrel be divided by three and the quotent be regarded as the proper capacity of the box and the basket. It was objected that this was a theoretical rather than a practical solution and that because of the fact that there are more air spaces and therefore more lost room in three small rectangular packages than in one large cylindrical receptacle they could not be expected to hold an equal amount of fruit. However as this seemed to be the only possible manner of getting together a majority agreed to adopt that plan and the quotient referred to, found to be 2342 cu. in., was adopted as the standard capacity of a box and a basket.

There is no question as to the advantage of discarding the many varied sized baskets, which pretend to be alike, and adopting one of uniform capacity so that all may know exactly what is meant by a "standard" basket of apples. Understand, this bill refers to a *covered shipping basket* intended to hold a bushel when *level full* and not to the ordinary bushel basket which will continue to be heaped as usual. The same arguments we have used in favor of an honest barrel apply to the basket with equal force.

In the case of the box the matter becomes more involved. There are even greater variations in dimension than in the case of

either the basket or the barrel. We believe, however, that this variation is a matter of opinion as to what is best rather than a desire to skimp the size of the package.

Oregon and California each have two boxes and Washington and Colorado one apiece, no two of the above being alike. When we come farther east there is no telling how many variations exist. Certain it is, however, that the purchaser of a box of apples is liable to receive any where from 2150.42 to 2550 cu. in. of fruit and the man who furnishes the latter, *which is an honest bushel,* is "throwing in" 400 cu. inches of apples or almost 20 per cent. as compared with the man who uses the smaller size box.

Western growers say that they cannot pack their apples in a different sized package, as they will not fit. When we consider the wide variation between the sizes of the many varieties they grow, much of the force of this argument is lost. We also note that practically all recent reports from the west indicate that they are rapidly abandoning what they term a straight pack and adopting the diagonal method. This admits of much more variation in the size of the package and we believe will enable them to readily use a package of standard capacity. Even if this is not true, they can continue to use their old package if desired, by simply stamping its actual cubical capacity on the outside so that the purchaser be advised as to just what he is receiving.

Do not confuse cubical contents with linear dimension. The bill *does not,* specify *how long, how wide,* nor *how high* the box shall be, *that* point is left *entirely* to the judgment and pleasure of the packer. It *does require* that the box and the basket *shall* contain *either* not less than the number of cubic inches specified or have their actual capacity stamped on the outside.

The permission to use a smaller package than specified, is also granted to the barrel user, provided he stamp the barrel "Short."

The number of cubic inches required for a "standard" box (2342), would heap a Winchester bushel about two inches at the highest point of the cone. Personally I should like to see this requirement raised to at least 2500 cu. in., which would increase the cone to about four inches. The consumer would then receive practically the same amount of fruit whether he bought a closed box or a closed basket, or whether the fruit was measured out to him by heaping the Winchester bushel. And the seller who ships to the market would be on the same footing as the one who hauls his fruit there and measures it out. *A FAIR, SQUARE DEAL ALL AROUND.*

I fear this is only a dream unless the *East* gets very busy. Our advice from the West is that all the Western Associations are preparing to send delegations to fight this bill headed by Mr. Dumas, who fought persistently in favor of the level Winchester bushel at the Washington conference last winter. *What are you going to do about it?* Will you write to your Congressman at once and ask his active support? We need this bill and we will have to work to get it.

In addition to establishing standards for closed packages this bill also seeks to improve the quality of the fruit to be shipped in them.

It does not come out flat-footed and *demand* that fruit be *either packed honestly or kept at home.* I wish it did. Although it is hard work to legislate rogues out of existence.

What it does do is to define a standard of grading to be known as "U. S. Standard" (this will be itemized later). Next it gives every fruit grower in the United States permission to place the mark "U. S. Standard Grade" on the outside of all his barrels, boxes and baskets of apples to be accompanied by the name of the variety contained in the package and his own name and address. It is supposed that this "U. S. Standard Grade" mark will, because of the implied guarantee of the government, cause the particular package bearing it, to be more highly regarded both in domestic and foreign markets and that it will, for that reason, command a higher price. It is also believed that this higher price will promptly stimulate growers to adopt the mark largely, as fruit not so marked will suffer in comparison.

But,—you may say,—how will that help the quality of the fruit in this closed package which cannot be easily inspected. Of course there is no one within these walls who would think of asking his government to guarantee a package into which he had deliberately or carelessly placed the kind of fruit which our friend Collingwood illustrated some time since as having been found in the middle of a barrel of "Fancy Baldwins" but you doubtless know of *neighbors at home* who might do such a trick and you may be sure that this bill has that man in mind when it "solemnly and sincerely declares and affirms" that if one of the "Pure Food" inspectors discovers a package which is not packed *"Straight"* in accordance with specifications, said inspector will see that the rascal is *fined generously* and *continuously* as an example to the rest of us. I am thinking, however, that it will be well for most of us to keep that word *"FINE"* posted in *big black letters* close to the packing table, lest we forget that *our* name and address must *accompany* the government guarantee, and allow that apple which is slightly under size or the one with a scarcely noticeable coddling moth indication of what is inside, to slip in *"unawares."*

The itemized quality specifications of this "U. S. Standard Grade" are as follows—please note it carefully:

1st. *Apples of one variety, which are well grown specimens.*

2d. *Hand Picked.*

3d. *Of good color for the variety.*

4th. *Of normal shape.*

5th. *Practically free from insect or fungous injury, bruises and other defects, except such as are necessarily caused in the operation of packing.*

6th. *A ten per cent. allowance for error in grading.*

There is a great deal of criticism in the west on account of the 10 per cent. allowance for imperfect fruit. They term it a "Bum" pack, a "Shovel" pack and other endearing titles. I am sorry myself that it is necessary to qualify the other requirements and particularly to the extent of 10 per cent. It seems to me that 5 per cent. should be ample. And yet, when we consider that much of the fruit in this country must be packed by hired help who are too often not

interested in anything but their wages, it is an open question whether, in view of that *"fine"* 10 per cent. is too much. Some writers have considered that it would be used as an excuse to deliberately place in the package ten faulty apples for every 90 good ones. I think this would be very rare and would soon correct itself, for it must be remembered, that *the growers name and address must be marked on the package* and the man who deliberately or even carelessly permitted ten per cent. of faulty fruit to reach the package would soon have a black eye with the trade and no amount of government guarantee would reinstate him. And on the other hand the shipping of a perfect pack would soon bring its own reward in increased inquiry for that man's apples at good prices.

The western growers claim to be packing a 100 per cent. *perfect,* grade of fruit, and demand that this bill should make no allowance whatever in the "U. S. Standard Grade." That is one of the things they will fight for. There is undoubtedly some difference between the box pack and the barrel pack. In a general way they cater to a different class of trade. The increased amount of labor necessary to produce and pack a box of *perfect* fruit makes it imperative that it be sold for a high price, particularly when it must in addition bear the expense of transportation across the continent. A limited class, comparatively speaking, are willing to pay this price if guaranteed perfect fruit. In the case of the barrel, if it is relieved of the extra labor charge which would be necessary in order to *insure absolutely perfect fruit* it can be sold to the large middle and lower class at a reasonable price and at the same time be practically sound under this "U. S. Standard Grade," even the occasionally imperfect specimen being in most cases suitable for some use in the domestic economy. With that view it is possible that two grades should be provided. One called "U. S. Standard Box Grade" and the other "U. S. Standard Barrel Grade," the box grade to have no allowance for imperfections.

This act also specifies three sizes of the Standard Grade fruit to be known as "Size A," "Size B," and "Size C." All fruit of the standard grade 2½ inches in diameter and over, to be known as "Size A." If the minimum size is 2¼ inches "Size B," and as "Size C," for a minimum of 2 inches. These sizes to be marked on the package and become part of the brand with which the contents of the package must correspond.

I am sorry to see three sizes specified. Two are certainly sufficient and none should be as low as 2 inches. The third size was included at the request of the gentleman from western New York, who said that many growers there have old Baldwin orchards standing in sod. He stated that these old orchards bore heavy crops of small fruit, running as low as two inches, which the owners wished to market. I think the point is not well taken. A two-inch Baldwin certainly can not be considered a well-grown specimen. I am of the opinion that it would be a kindness to those growers to exclude their small fruit from the "U. S. Standard Grade," and encourage them to prune, fertilize, cultivate and spray so as to produce fruit of a better size, better color and certainly therefore of better flavor.

I am in favor of abolishing the "Size C," thus making 2¼ inches the smallest size allowable. If there are a few small growing sorts which good orcharding will not produce over two inches, and which otherwise deserve a place under the "U. S. Standard Grade" then it would be better to specify that those varieties only should be admitted under the "Size C," rather than open the door for the admission of runty specimens of large growing sorts.

We have now considered the packages and the grades as included in this bill. The package regulations affect every one who ships apples across state lines, which is right. The grading rules affect *only those who elect to make use of them* which is all right *as far as it goes.* But how about the vast number of growers and packers who do not elect to make use of the grade mark? This class will include most of the rascals. What is to hinder their continuing as in the past to pack fruit dishonestly. It will be sold low to poor people and to those in moderate circumstances; some of it will find its way through attractive facing, into better class of homes but will prove a disappointment and loss wherever it goes. *What recourse has the consumer?* What is the remedy? *Is there anything we can do* as a society to improve these conditions for the consuming public and incidentally improve the reputation of our business, which in the end can only mean better markets, better demand and better prices. I think so, at least we can try. I believe the remedy is right in this Lafean Bill. I have always contended that the bill should go a step farther and take cognizance *not only of the fruit,* which a few growers, comparatively speaking, *elect* to pack under the standard grade provided by this act, but *of all fruit shipped across state lines* or into foreign countries. There need be no complicated specifications. A section added to the bill as follows would cover everything:

"*All closed packages of apples* entering into interstate or foreign commerce *must bear the name and address* of the packer or the party in whose interest the packing is done. If the packer attaches any statement, design or device intended to indicate the character or quality of the contents such statement, design or device shall be regarded as a brand with which the contents must correspond in accordance with the "Pure Food Law." In case of no external qualifying statement the "face" of the package shall be regarded as the packers statement of the character of the entire lot, and therefore a brand to which the balance of the contents must conform."

I believe very few indictments would be found necessary. The *necessity of placing his name and address on the package* would cause almost any man to hesitate and do a lot of thinking before placing fruit inside which would render him liable to prosecution. It is true, as stated before, that you cannot legislate honesty into a man, but as most dishonest men are moral cowards I am sure a regulation of this kind in the hands of the pure food people would have a very beneficial effect. I sincerely hope that it can be brought about. To repeat, WHAT ARE WE AS A SOCIETY GOING TO DO ABOUT IT?

The President.—We shall be glad to have Mr. Case tell us what the New York growers think about this bill.

Mr. Case.—All I can say is, that we had this matter up at the annual meeting of the New York Fruit Growers' Association, and after considerable discussion, they passed a unanimous resolution endorsing the bill. There were very few people opposed to it. Mr. Schaffer, representing the Apple Shippers' Association; Mr. Hayes, representing the Fruit Growers, and Mr. Mann, representing the Western New York Horticultural Association, were all very much interested.

I will have to leave now to take the train. I thank you very much for inviting me down here, and feel that I have been very well received. I have learned a lot of things, and they are all of value.

We are going to have the eastern meeting of the Fruit Growers at Poughkeepsie in February, and if any of you can see your way clear to attend that meeting, I think I can safely promise you a really good time. I thank you.

Mr. Eldon.—I think this is a matter that is of very much concern to us. It was my pleasure to attend a meeting of the growers, shippers and handlers at Washington, and I heard there much that is brought out in the paper of Mr. Tyson. Mr. Edwin C. Tyson knew more about it than the rest of us, and I am sure he advanced a very able argument for the passage of the bill. It is a fact that the apples grown in this country, with the exception of the apples grown in the west, are very much under standard in foreign markets, and very much under standard in our own markets. Our barrels offered to Europe are often turned down. As an example of what our home market gets, one of our members placed a package here, taken from what is said to be first class packing, and it is the same thing that other consumers face when they buy a barrel of apples without being able to see their purchases. I am going to open this package. It was taken from a barrel of good apples, bought by a gentleman whose word has always been known to be good. Mr. Fenstermaker is the man who gave this package to me, and these apples were bought in barrels, a car load of them, from Wayne County, where they were grown. (Empties on the table a lot of miserable small and defective apples.)

Now, Mr. President, I do not come from that particular county; I come from Adams County, and I know there are just such cases in Adams County. The man who bought the principal crops in Adams County, found when the fruit got to New York, that in one case the middle of the barrel contained just such fruit as this, and when it was investigated, it was found that they came from a man who had one of the most profitable orchards in Adams County. Now, that is no better than stealing. Now, Mr. President, there are some growers in Adams County that are determined to reach this offense by law, and I therefore move that we endorse this bill.

The President.—I have always thought that if the man's name was on the package, it would do away with these things, but in this

case it does not. I had a friend from Ohio in my orchard this fall, and I asked him whether they had any Pennsylvania apples in their markets; he said that they had formerly had, but they found that while the top of the barrels was all right, the bottom was so mean, that they fought shy of Pennsylvania apples this year. I asked him from whom he bought these apples and he mentioned the name of a man who is a member of our Society. This simply emphasizes the fact that we must do something.

Mr. Eldon.—I offer this motion: That the Pennsylvania Horticultural Society endorse the Lafean bill in all its parts, and also the additional suggestions of Mr. Tyson, in the most emphatic manner.

A Member.—I have not heard the reading of the entire bill, but I should like to know whether it covers the re-packing of the fruit by the commission merchant?

The President.—The last person who packs that box is compelled to put his name on it.

The Secretary.—Further than that, Mr. President, the same rule that applies to food stuffs, applies in this case also.

Mr. Lewis.—I was not in the room when the bill was read, but may I ask, does it prevent the repacking of a package, and fixing it up? I believe there are authentic cases where it has been done.

The President.—I believe, in such cases, the packer must present proof through his own packing house, that this was tampered with. How could they have gotten in by re-packing if they were not in, in the first place?

The Secretary.—I heard Mr. Fentermaker say that these apples were shipped in a barrel from the man who grew them to the man who bought them.

A Member.—I am from Wayne County, and I might say that the man whose name appears on the package is not a grower, but a buyer.

The Secretary.—These are the people that are making us the most trouble—men without principle and with no good reputation to lose.

Having been properly moved and regularly seconded, the motion was unanimously carried, and the bill is endorsed in all its parts.

The President.—The Constitution says that the Executive Committee shall decide on the place of meeting, but we want to know, in the first place, whether we want to hold a summer meeting. I would like to put the question. Our last summer's meeting

was an excellent one for those of us who were there. Shall we hold another next summer?

Mr. Eldon.—Our Secretary gave us a report of the summer meeting. I was not there because I could not get away from my work at that time, but that has nothing to do with other people's enjoying themselves. I think he also reported it a financial success, because there was some money left over. I therefore move that we hold a summer meeting, provided the Executive Committee can work out the details of it.

The President.—We have one invitation, but not the same offer to pay part of the expenses of going out there. I think the meeting last summer did a great deal of good. Erie County has been apart from the State for many years. They are pretty close to New York, and they grew to feel that the work being done in agriculture and horticulture and by the Experiment Station was not for them—that we had no interest in them. Our meeting up there last summer went very far towards changing that feeling. They seem now to feel that they are a part of Pennsylvania, and that we care something for them, and it seems to me that if we go where we are not known, we can gradually get the whole State to join our Association, and that is what we want. I think that the motion giving the Executive Committee authority to arrange the whole matter, is an excellent one. What shall be done with it?

This motion was properly seconded and carried.

The President.—Now, is there any one that wants to give us an invitation? We have one from Mr. Wertz, of Waynesboro. He says we can very easily hold our sessions in Waynesboro, where there are good hotels, and which is within easy reach of some six or eight large orchards. The time would be about the first week in August. I don't know whether the committee will decide that it is possible to go there. Now have we any other invitations? If not, the matter will rest there. The matter of fixing the place for the annual meeting will also be left to the Executive Committee, and the Society notified.

We will now stand adjourned until 7.30 this evening.

THURSDAY, JANUARY 13, 1910, 7.30 P. M.

President Hiester in the Chair.

The President.—The first number on the program this evening will be a talk on "Celery Culture," by D. W. Hull, of Waymart, Wayne County.

CELERY CULTURE.

By D. W. Hull, *Waymart, Pa.*

Mr. President, Fellow-Members of the State Horticultural Association, Ladies and Gentlemen: To say that I feel it a great honor to be asked to talk to you is stating it very mildly. I have never talked to an audience of farmers, except to a few neighbors, when we meet as neighbors will. So I would like, to-night, to use the broader definition of "neighbor" that Christ gives, and that will include us all.

Perhaps I should say that I am not a market gardener in the sense that our President used the word, although probably we started in on that line. At this time we are celery specialists. I might say that the reason we are able to make a profit out of celery is because it receives our main time and attention; it is first with us. Now, we have about three acres each year of this, which brings us in quite a good deal more than our other 190 acres, and this is pretty good land too, as our meadows yielded over three tons hay to the acre this last season. But the celery has not only been the main support of Hull Brothers, but is enabling us to set the rest of the farm to apples and peaches. This three-acre plot is a renovated swamp, drained about right for celery muck, but not quite enough for other crops.

The Secretary.—Did you tile it?

Mr. Hull.—No; we don't use tile drains. The muck ground is so nearly level that we are afraid they would fill with the soft soil, or our horses might get them out of line, if they should sink in over the drain. In wet times we have to use mud-shoes on team, and to be sure of good drainage, we use open ditches; cleaning them out anew each spring.

We began celery growing by renting four acres of partly developed muck ground, but it was eighteen miles from market, and seven from nearest station, while we were very inexperienced; so we about bankrupted the first two years. But the next two we gained a little, so were able to bring to Waymart a team of mules and some over $200.00.

I think it was the last year on this rented plot that we raised a small patch of celery which gave us an idea of its possibilities. It was where a small celery shed had been the fall before, and the roots, refuse, etc., from the celery cut there, and had been spread over this, making the yield seem wonderful to us. Amounting to the rate of nearly $2,000.00 per acre on a small spot. This proved its possibilities, if we could only supply fertilizer in a wholesale way that would grow the celery as the celery-refuse did.

But at Waymart we gave notes for over $9,000.00, while we were only worth about $500.00, so we felt too poor to buy fertilizer for a few years. About this time my brother was very sick with smallpox, which cost us so heavily that we felt we needed to make strenuous efforts, so we fertilized celery and early cabbage

much more than ever before, and in the fall we were better off than we had been any season yet, for all of our heavy expenses. So since then we have kept increasing fertilizer on celery.

Our main crop is Golden Self Blanching, which we start in a couple of small green-houses, built quite cheaply and heated by stoves. The seed is bought fresh each year from Henderson, because we think the new seed produces the most vigorous plants. This is sown in rows three inches apart with a "Eureka" drill, which is about right for greenhouse work, but the plow and coverer are taken off, so we can just barely cover the seed by sifting fine soil very lightly over the benches. We commence sowing about March 1st, finishing about March 20th. Our greenhouse soil is made up of loam, muck, sand, fine siftings from coal ashes, and manure. We do not sterilize it, because we believe the sun does during the summer, when it gets so dry and hot, so we just add humus in the shape of muck and manure, and use year after year. We fertilize with about 600 lbs. of Bone Meal, and nearly as much wood ashes, on nearly 2,000 sq. ft. of glass.

We try to get the soil in the benches just as level as possible, because if any higher spots are left, the water will run off of them, leaving bald spots, because celery seed must have plenty of moistrue or it won't germinate. After leveling and packing, the soil is saturated with all the water it will hold, seed sown, covered, then calico curtains are stretched on wires about six inches over the beds. Calico proves better than anything lighter or heavier; and if it should be of a blue shade, we dye it red, because red will let the chemical rays of the sun through, while blue will not.

We do not let these beds get at all dry, yet because of the curtains, we only have to water a little before they are up, which is two or three weeks. The curtains are removed as soon as plants are up, and as soon as they are large enough to grasp, we commence thinning to about one-half inch in the row, aiming to have 100 plants per sq. ft.

Broadcast sowing is just as good, only but few men can thin as fast that way. The ground is kept stirred around them, and if the plants are too yellow, we water less, or if too dark green, it shows that they need more water. If not growing fast enough, we water with nitrate water, but we dilute this quite a good deal.

When plants are four inches high we clip them so they will make a stockier growth, and also a better root system. Clipping two or three times. About two months from time seed is sown, we try to set in the field, but we have to be careful and not set too early, because if they freeze much before the roots are established, it will kill them.

We plow this muck in the fall, if possible, and then in the spring cutaway it well, making it just as fine as possible. Fourteen per cent. dissolved rock is then spread on with shovels from a stone-boat, using eight tons on the three acres. This is acmed in well, then a little over half a ton of muriate of potash per acre is sown on by hand.

The Secretary.—Do I understand you to say that you use half a ton of potash per acre in addition to nearly three tons of phosphoric acid?

Mr. Hull.—Yes, more than half a ton; about two tons on the three acres. Our experience has been that the more fertilizer we put on, the better our celery will be. We have not reached the limit yet, and the celery is worth ever so much more per acre than the fertilizer is. Celery is nearly all water, anyhow, and we leave the roots in the ground, which contain most of the fertility in the plant. We neglected to have enough potash put on in 1908, and that year we lost $800.00 or $900.00 from heart-rot, but keeping too closely shut up in our newly built celery-house also favored the rot considerably. We find that when we use plenty of potash, our plants, of any crop, will be so much healthier. I believe it is because potash has such a large part in enabling the plant to get carbon from the air, and this carbon should be half of the solids, but if potash is lacking, so a normal amount of carbon can not be used, why the plant will use nitrogen to take the place of some of the carbon.

Now we know how carbon resists decay, because the lower ends of fence posts are often charred to make them keep better, and we know that in any process of decay, the nitrogen is by far the most active.

After the muriate is sown, the soil is planked, weighting the planker enough to give the right firmness for setting, as we want the plants well pressed in the soil, without pushing them down so the heart will be at all covered.

Our rows are laid out three feet apart, with lines, generally running a light wheel-marker beside the line, so it can be taken out of way. If soil is not moist enough, we run a stream of water along the mark, putting the water in a straight line, as the setter follows the water-line. The water is close by in the ditches. The plants are clipped just before setting, so as to have less top to evaporate moisture while the roots are getting established.

The Secretary.—Cut them pretty close?

Mr. Hull.—About one half, and then we take them up with all the soil clinging to the roots that will, but we do not puddle. Perhaps we ought to, but we keep the roots wet. These plants are set about five inches apart, but we find that set at four they seem to grow as large as farther apart. We use two fingers of one hand as dibber, while other hand places plant, both hands packing it. If ground is in nice moist condition, we can set quite fast. Sometimes set in the rain with oil suits on. My brother is the fastest setter I know of, and in good setting, can set one thousand plants an hour.

Mr. Garrahan.—What time do you plant these plants in the field; in April?

Mr. Hull.—No; not as early as that; we generally commence the first week in May. You see we have to guard against the frost.

Mr. Garrahan.—Do you ever have any trouble with their growing to seed?

Mr. Hull.—Yes; in 1907 I think we lost nearly a thousand dollars worth. But we raised $3,000.00 worth that year for all of this set back, and to make a good profit with a loss from some source makes us feel safer than to make the same profit, but with no bad luck.

As soon as the plants are set, about thirteen hundred pounds of dried blood to the acre is strewn along very close to the plants, so the roots can reach it. And as soon as the roots start a little, we commence putting on nitrate of soda, but at first, very carefully, having it pulverized well, and putting only a very little along within reach of the roots, but trying not to get it on the plants, as it will burn. We have found that small plants can only stand a little of this without a setback. We repeat the nitrating every ten days, increasing the amount as the plants get larger.

Mr. Engle.—Do you apply it by hand?

Mr. Hull.—Yes; I don't know of a machine that will do it thoroughly enough, and we want to know that it is on all right, so as to give all of the plants the very best start.

The President.—How much nitrate do you use in a season to an acre?

Mr. Hull.—About the same amount as we do of muriate, or about two tons on the three acres. This is all the fertilizer we use, excepting that every two or three years we lime it, putting on about a ton per acre. We think that using so much acid phosphate is apt to sour the soil.

Of course we try to keep the soil loose around the plants all the time, keeping the weeds down, and holding the moisture in the soil by an earth mulch. If not too wet, we cultivate with a horse, some, and we use wheel-hoes quite a good deal. We hand hoe with small, well sharpened hoes, always keeping the soil as nearly level as possible. Sometimes, if it should be wet, and impossible to kill weeds on this rich, moist soil, before they would ripen their seeds, why we carry them off; sometimes taking off a hundred bushels or more, and putting a good deal of it around our mulched apple trees next to celery plot.

As soon as the earliest is fifteen inches high, we put boards on it, using hemlock about a foot wide. We fasten them up with hooks made of No. 9 unannealed wire, with ends cut off sharp, and long enough so the boards can have about five inches between them. Hooks are put on diagonally to bring boards closer together if celery is lighter, as at first blanching. We use one hook for each pair of boards, putting it on about three feet from end of boards, and then

the next set are pushed one inch or so inside of those just hooked. By lapping thus, instead of butting, the boards are held up firmer, and light cannot enter at the ends. A little soil is then hoed up along the lower edge of boards to keep the light from getting under. Boards are kept on from nine to twenty days, according to weather, etc., and cut with pruning knives; trimming root all off, with square cut on the end. In warm weather this is washed in cold well water, so as to cool it well, and in warm water in freezing weather, so the celery will stand longer without cooling.

We tie in round bunches, originally with three plants in a bunch, but lately our celery has been so large that we tie very many with only two, and perhaps two hundred plants this year each went as a bunch, by just tying a string around the top. Of course we try to put uniform weight in each bunch. We tie with jute twine, but have thought of using tying ribbon, with our name printed on it. We plan to do this, because some have tried to trim and tie as we do. Most of this is sold from the wagon in Carbondale and Honesdale, right to grocers and retailers of green stuff. Yet, quite a lot is shipped to near by towns, mostly f. o. b. Waymart.

In trimming we are quite careful to take all of the green stalks off, because it pays better to keep it home.

A Member.—Have you any way to utilize the waste celery?

Mr. Hull.—Only as fertilizer; last year, 1908, quite a lot of celery rotted in the storehouse, and we were a little afraid to put it back on the celery ground, so put it around our apple trees near by, and they appreciated it very much. Yet where we put a little of the heart-rot refuse on the celery plot, for a test, we had no rot this last season.

Our main variety is Golden Self Blanching, but we did not think it was quite what we wanted for storing, so we tried about seven different sorts and strains last season, and got badly fooled on one of them. This sort was claimed to be better for early too, so we sowed nearly an ounce in the greenhouse, but it amounted to about nothing.

A Member.—What variety?

Mr. Hull.—Silver Self Blanching from Henderson. We also tried it in the later sowing outside, but the plants amounted to nothing from there either, although with the very same care as the others had. Am quite sure we tried this variety when it first came out, and thought it about like White Plume?

The Secretary.—Could you not conclude that it perhaps does not like muck land?

Mr. Hull.—Possibly, yes.

Mr. Garrahan.—It is not a very good variety, anyhow.

Mr. Hull.—No, I don't think so, but it sort of puzzles us why it would be sold, or if the seed last year was all a failure? We wrote the seedsmen about it, so as to get light on it, but they have not answered our last letter. Perhaps we will have to change our method of using new seed, and always testing it a year ahead, so as to be sure it is all right. A writer in Marker Growers' Journal criticized Prof. Watts a little for reporting our way of sowing new seed this way, saying that it was an unsafe practice, but we felt that if we got the best French grown seed, we were safe, but of course this was of the Golden Self Blanching. Will go very carefully on new varieties hereafter, but all of the other sorts did as they should this season.

The celery that we blanch in storage is cut loose with a spade, outside stalks trimmed off a little, with some soil left on the roots, taken to celery-house, set on the rather moist dirt floor there, trying to have it stand as upright as possible, placing the plants close together, but trying to not pack the tops too much. We want air to circulate among the leaves as much as possible, so as to take up all the moisture from them that can be. This house is 50 by 150 feet, with double concrete walls, about five to six feet high. Rafters are eight inches wide, and flooring is nailed on under side; this space is packed with straw or hay, with iron roof over it. The gables are double too, and north one is packed. A ventilator all along the peak a foot wide, has double doors; the large ventilators at the ends are double too, and so are the windows. But the doors are single, yet with air-space. Ought to put in double doors too, and will, we think.

This house will hold from $1,500.00 to $2,000.00 worth, and is very satisfactory. Cost nearly $3,000.00. Is so much better than temporary shed made of blanching boards; then we need the boards yet for outside blanching when they are needed for the shed. And then the damage to the boards is quite an item, when tearing down, and the time building and taking down each year cost quite a good deal too; so we are well pleased with our house, and with a fire keep it from freezing when below zero.

As to results: In 1907 we sold a little over $3,000.00 from this three acre plot; in 1908, between $3,400.00 and $3,500.00, and last season will be as much as 1908. And none of these years was a full crop, as first so many grew to seed, then the heart-rot, and lastly the Silver Self Blanching that would not grow, the loss each year amounting to from $800.00 to $1,00.00.

The Secretary.—Do I understand that these are the net figures?

Mr. Hull.—The gross receipts, out of which the labor and fertilizer must be taken. If any expressage has been paid, it has been deducted. We will try to grow $5,000.00 worth from this field.

Mr. Garrahan.—How many years do you think you can grow celery on this same land?

Mr. Hull.—It seems to grow better each year; we do not have any disease this year; possibly a tenth of one per cent. rust, and the same amount of blight.

The Secretary.—What do you know about the expense?

Mr. Hull.—It is about half, I guess. We are thinking of keeping an account of labor, so that we will know exactly.

Mr. Garrahan.—What other variety do you like after the Golden Self Blanching?

Mr. Hull.—Columbia is about the best. We have Golden Heart and Golden Dwarf following this, but it is too late for us. We have tried White Plume in place of Golden Self Blanching, but our customers like the latter better, and so do we.

Am quite sure we had plots of Golden Self Blanching last season that yielded $1,000.00 to the half acre, because our two acres of this, yes, less than two acres, yielded over $3,000.00, and we had an ounce of this seed from Burpee that was extra fine. Oh, there is a wonderful possibility in seeds! And celery seed increases a thousand fold, financially, so *good* seed could easily be worth $100.00 a pound more than a poor strain of seed.

Now the main value of these very large plants, ones that we get 10 cents for wholesale, is the possibilities they teach. It simply proves they can be grown, and that if we get the conditions on a whole field as the conditions are for those individuals, why the whole field will be as large. This would yield at the rate of $4,000.00 per acre.

But my brother and I both honestly think that celery does not pay any better than any other crop under like conditions,—that is, favorable soil, market, etc., and that we don't know as we would care to go through the experience we have in growing celery, knowing it as we do now. We might have taken up fruit growing, because naturally, I think, we like that better. Perhaps I should turn this around and say that we think any other crop will pay as well as celery, if the same care and also favorable conditions are furnished it.

Would advise any new beginner to go slowly, carefully and thoroughly with celery, because it won't stand carelessness; but if it is quite well understood, it does not seem to be a fickle grower. I should say that we put rows two and a half feet apart where we expect to store it, because it seems to grow as well. But this distance is rather close when we come to hoe the dirt up to the bottom of the boards in blanching. And we like to put lime on in the fall, because it is better not to have it come too much in contact with the acid phosphate, as the lime tends to make the phosphoric acid insoluble.

The President.—We will now take up the next number on the program—an illustrated lecture on "Experiments with Cabbage and Tomatoes," by Prof. C. E. Myers of State College:

EXPERIMENTS WITH CABBAGE AND TOMATOES.

Prof. C. E. Myers, *State College, Pa.*

The Department of Horticulture of the Pennsylvania State College and Experiment Station is making an exhaustive study of the three leading truck crops, viz.: cabbage, tomatoes and asparagus. The work includes seed selection, methods of culture, fertilization, variety and strain tests. Of these the strain tests are considered the most important.

In order that I may give a somewhat definite idea of the work I shall discuss each of the crops in order.

Cabbage.

It is generally conceded that cabbage is the leading as well as one of the most profitable of the truck crops. It can be grown with comparative ease, and on a wide range of soils. To secure best results, however, the soil should be well drained, yet of large water holding capacity, and possess an abundance of readily available plant food.

In discussing the culture of cabbage it is well to take note of the general character of the plant. We note that the leaves are the essential part of the plant from the market standpoint. We also know that nitrogen is the element of plant food so essential in the development of that part of the plant, hence the need of an abundance of this element in the soil. Director Patterson of the Maryland Experiment Station has shown that ninety-eight and one-half per cent. of the cabbage head is water. Thus for every ton of cabbage sold we actually sell nineteen hundred and seventy pounds of water.

In order to secure and maintain a soil in a condition best adapted to the successful development of the cabbage plant the method of soil management previous to the planting of the crop as well as after it is planted is an important consideration.

We have already seen the importance of water to the cabbage crop. Experiments have proved that most of the water utilized by the growing plant is not that which falls during the growing season, but is the water that has been collected during the preceding months and held in the subsoil until the plant is ready to utilize it. We have also learned that the best way to collect and hold this water is by having the soil rich in humus, by plowing as early in the spring as possible, and by maintaining a surface mulch on the soil to prevent loss by evaporation. Experiments conducted at the Wisconsin Experiment Station have shown that in the spring when the soil is wet, when its texture is close from the packing which has resulted from the winter snows and early spring rains, the loss of water is very rapid and may exceed twenty tons per acre daily, and this loss may extend to depths of more than four feet. Another experiment showed that when a piece of corn ground was plowed on April 28 and sowed to oats but little water was lost during the week which followed, while an adjoining unplowed strip only ten feet

away lost during the same time one hundred and ninety-eight tons per acre. Furthermore, the land plowed at the later date was in a poor physical condition, and was with considerable difficulty placed in a suitable condition for plant growth.

The humus content of the soil may be increased by either of two methods; first, by the use of stable manure, and second, by the plowing under of green and cover crops. When it is possible to procure stable manure at a reasonable price it is probably the cheapest and most satisfactory way of maintaining the humus content as well as the fertility of the soil. In some sections of the country cover crops as crimson clover, cow peas, vetch and rye are used with excellent results in maintaining the humus content of the soil. They not only keep the land covered during a large part of the year, but they utilize available plant food which otherwise would escape and put it in a condition which may readily be utilized by the crops that follow. At the time of final preparation of the soil, care should be taken to thoroughly incorporate the vegetable matter with the soil. It is important that this be done or the capilary rise of water from the subsoil may be cut off and thus the end prevented we seek to obtain. It is well also to emphasize the importance of having the soil thoroughly prepared to a good depth just previous to the time of field planting.

Seed.

There is probably no more important question confronting the farmer to-day than that of good seed, and certainly none to which he should give greater attention. At the outset permit me to say that as a whole I consider the seedsmen to be a reputable class of business men, but there seems to be enough of the undesirable element present to make the position of the farmer an unenviable one, and one which frequently results in material financial loss.

The first point the farmer should consider when purchasing seed is the germinative ability of those seeds. Unless a reasonable percentage of the seeds germinate an unsatisfactory stand is liable to result. In a series of tests of thirty-five strains of Danish Ballhead cabbage seed made by us during the past season the germination varied from one to ninety-eight per cent., and in the first instance the seed was purchased in January, 1909.

In our work at the college the seed for the early crop is sown in flats in the greenhouse about the first of February, and transplanted about one month later and placed in the cold frames. The field planting is made soon after the middle of April. Experiments have shown that it is important to maintain an even and continuous growth from the time the seeds germinate until the crop matures. In a test made during the past season of fall grown plants wintered in the open ground at White Marsh, Maryland, vs. spring grown plants secured from the same place, it was found that the spring grown plants were decidedly superior to the fall grown plants. A large percentage of the fall grown plants went to seed and quite a number of them failed to make any material growth, while the heads of those that matured were scarcely more than half as large as the

heads from the spring grown plants. There was no material difference in earliness.

Experiments seem to indicate that the size of the plant at the time of field planting is not of much importance, so long as the very large and the very small plants are discarded.

Varieties.

A great deal might be said about varieties of cabbage. It is probable that there are several hundred so-called varieties listed by the various seedsmen, and each year the number is being increased. In some instances new varieties of merit are thus placed in the hands of the farmer, yet there seems to be a decided tendency to put out old varieties under a new name. It is interesting to note to what an extent this is done as any person may prove for himself by planting side by side the seed of a number of so-called varieties of the same general type. Frequently too large claims are made by the seedsman concerning a particular variety, and in some instances these extravagant claims are accompanied by pictures to further impress on the reader the great value of the variety which in reality does not exist. In the testing of new and untried varieties my advice is go slow, and when making a test do it under the same conditions afforded the regular crop, and if possible in close proximity to it so that a careful comparison can be made.

During the past season we made a test of thirty-two early and thirty-three late varieties. In some instances the tests were highly satisfactory, and upheld the claims made by the seedsman from whom the seed was purchased, while in other instances there was no perceptible difference between several so-called varieties except possibly the extra price charged for the seed. In other instances they were old varieties under a new name.

It is probable that the one phase of the experimental work which most interests the person engaged in truck farming is the strain tests. In this work we have aimed to show the relative value of seed of the same variety from different sources. The work was begun two years ago with Jersey Wakefield and during the time that has intervened some interesting results have been secured. In some instances certain strains produced scarcely anything worthy of being called a head, and did not mature until very late in the season. In fact the per cent. of the crop marketable three months from the date of field planting varied from nothing to ninety-eight per cent. in the test of twenty-five strains, while there was also a material difference in the size of the head as well as the per centage of plants which matured marketable heads.

This work was last year increased to include the varieties Charleston Wakefield, Early Spring and Early Summer. In these varieties the differences were not so noticeable, although were of decided importance. In some instances substitution of varieties were noticeable, and where this is knowingly done by the seedsman without the knowledge and consent of the purchaser that seedsman merits all the adverse criticism he may receive. An interesting feature revealed by the tests is that in many instances the plants

which appeared the most promising during the first part of the season later became the least valuable. The results of these tests are published and can be had by applying to the Experiment Station, State College, Pa.

The insect injury to cabbage is worthy of note. Two classes of insects attack the plant and either may cause considerable trouble. The cabbage aphis or "louse" may appear any time and if not combatted may frequently cause serious damage. It may, however, be readily held in check by spraying with a ten per cent. solution of kerosene emulsion or with some good soap solution. The application should be thorough and particular care should be used to destroy the insects clustered about the growing center of the plant, for unless this is done the plant will not develop. The "cabbage worm" usually appears about the time the crop begins to head, and destroys the plant by eating holes through the leaves and head. It may be successfully combatted by a spray composed of one pound of arsenate of lead dissolved in one hundred and fifty gallons of water.

There are also several cabbage diseases which sometimes cause serious trouble, of which the black rot is the most important. It may be recognized by the discolored blotches along the margin of the leaf and by the black spots in the cross-section of the midrib. It is a bacterial disease and there is no known remedy for it. It may be held in check by destroying by burning the infected plants, and cabbage or allied crops should not be planted on infected soil for a period of several years. The heavy application of lime to the soil is said to be a benefit in preventing the disease.

Tomatoes.

What has been said concerning the soil conditions for cabbage is largely true for tomatoes, except that less nitrogen is needed. Here we are dealing with a crop in which the fruit is the essential part, and an excess of nitrogen tends to produce a large growth of vine and soft, watery fruit. This being the case we need a fertilizer containing less nitrogen but more phosphoric acid and potash, and particularly the latter. It is impossible to prescribe a fertilizer which will apply to all soils, but in general we may say that an application of eight to ten tons of stable manure to the soil the preceding fall, well worked in, and this supplemented by about five hundred pounds of a 4-8-10 fertilizer in the spring at the time of planting should give good results on a wide range of soils.

The handling of the plants previous to the field planting is an important consideration. A number of experiments have been performed by the various Experiment Stations, and it seems that two transplantings previous to the field planting give better results than more or less than this number. In our work at the college we have used paper pots with excellent satisfaction at the time of the last transplanting. We use a manila paper of medium weight and make the pots one and three-fourths by two and one-half inches in size. This gives the plant sufficient space in which to grow from the time it is transplanted until placed in the field, and is an important factor in securing early fruit as well as an even stand of plants, since by

this method the plant sustains no shock in being transplanted. This point is especially noticeable in case the ground be a little dry at the time the field planting is made.

Varieties.

What has been said about varieties of cabbage is generally true about tomatoes. Last year we made a test of fifty-nine so-called varieties. In some instances the varieties were new and distinct and worthy of a careful trial by all engaged in the culture of this vegetable, while in other instances it was impossible to distinguish the so-called new varieties from well-known old varieties.

The strain tests were conducted on the same plan as with the cabbage and included the varieties Earliana, Chalks Jewel, Matchless, Beauty, Globe and Stone. The first three named varieties have been tested for two years, and some interesting results have been secured. For these tests ten plants of each of twelve strains were compared. The results for two years show that the yield of Earliana has varied from eight to eleven and nine-tenths pounds per plant. This would mean that should we set the plants three by four feet apart in the field there would be a difference in yield of the two strains of seven tons per acre. A similar test with the variety Matchless has shown a variation in yield of from eleven and one-tenth to fifteen and three-tenths pounds per plant, which would result in a difference in yield of five and seven-tenths tons per acre were the plants set four by four feet apart in the field.

Little can be said as to the best way of securing the high yielding strains. We must, in a large measure, depend on the integrity of the seedsman from whom we secure the seed, and it is well to purchase from several. In general, it may be said that it is well to secure a variety from that seedsman who introduced it and who considers it as one of his specialties, since in that way we are more likely to get seed of known value than when it is purchased from a dealer who has no especial interest in the variety.

Marketing.

An essential point in profitable tomato growing is the marketing. When the crop is grown for the cannery this point concerns us but little, but where the plant is to supply a basket trade the question is decidedly different. To handle the crop in the most profitable manner requires a careful study of the market, and it is probable that specific directions cannot be given which will apply to all places and conditions. There are, however, a few points which are general in their application.

In the first place the crop should be graded and put up in an attractive manner. The fallacy of putting "new wine in old bottles" applies equally well to tomatoes as to wine. Unless the package presents an attractive appearance, even though the goods be of a high grade, it will not bring the best price. A second consideration in marketing the tomato crop is uniformity. Where a high price is expected the need of having the fruit run uniform in size and color

is an important one. Where care is taken to produce early fruit of good quality, and put it up in an attractive package the tomato crop may be made to yield handsome returns.

Mr. Engle.—What early, and what late varieties of cabbage did you try?

Prof. Myers.—Early Jersey Wakefield, Early Racehorse, Express; you can depend on Jersey Wakefield, followed by Charleston Wakefield, and then by Succession. For late crops you can plant the Succession and the Premium Flat Dutch.

Mr. Garrahan.—How do they compare?

Prof. Myers.—The Early Racehorse is considerably earlier than the Early Jersey Wakefield.

Mr. Engle.—I was told by an experienced grower that he could cover the season with Jersey Wakefield and Premium Flat Dutch.

Prof. Myers.—Both are good, but I think the Surehead is the better.

Mr. Engle.—Do you think it is best to grow your seed, or is seed obtained from a grower in the neighborhood better than the seed obtained from a seedsman?

Prof. Myers.—I cannot answer that question; it just emphasizes the importance of knowing what you are getting. I know a man who went to a seedsman for Jersey Wakefield seed; they told him they had two kinds, the one for $2.00 and the other for $7.50 per pound. He decided to take the high-priced seed, and it cleared him $85 per acre over the cheaper seed.

A Member.—Where can the best Charleston Wakefield seed be obtained?

Prof. Myers.—That is a question that I cannot answer off hand; Webber & Don seeds do very well on it.

Prof. Surface.—Did you get an early seed from Henderson?

Prof. Myers.—No.

Prof. Tompson.—Has any work been done towards separating seed according to size and weight?

Prof. Myers.—Yes; but the results of two years' experiments with large and small seeds show that there is not very much in that.

Prof. Surface.—This topic has brought out a subject which should receive our close attention. It is one upon which I have

been working on myself. It has been recognized fully by the farmers of Pennsylvania, and throughout the country that in stock breeding it is important to select the best animals for that purpose, and it is time that we recognize that the same biological principle prevails in plants. Directly bearing upon this is the government distribution of seeds. I believe that the greatest injury that can be done to the farmer is to send out these low grade seeds that are bought for so many cents, instead of so many dollars, per pound; they are worse than worthless. Prof. Myers has shown us how one grower by paying $7.50, instead of $2.00 per pound for his seed, made a gain of $85 per acre. What does it profit to buy seeds at from twelve to fifteen cents a pound, that have no quality, and send them out so that the Congressman may get the vote of his constituents? I think it is an injury to the American citizen to tolerate such a thing, and I believe this is one of the most important subjects that has been brought to our attention.

Mr. Hull.—I would like to say just a word on this seed business. In our tests last year, we tried some Golden Self Blanching that came, as it had been claimed, from the originator, and when it came up my brother asked me several times "what makes this so different?" It looked waxier, and came out better, and looked better in every way. I didn't say anything then, because I was not so sure about it, but since then I have looked into it and I am convinced that it was on account of the seed. There is no other reason, and it seems to me that the seed of the originator is one of the best claims there is to the quality of it.

Prof. Tompson.—There is one field of work that has been carried on in our college for sometime, that would seem to indicate some progress in the matter of seeds. In the Pathological Department the experiment was made, under Doctor Stone, of blowing the tobacco seed, to separate the lighter from the heavier. The results have been such that they have begun to experiment on onion, and other vegetable seeds. The aim of our greenhouses is to have the seeds uniform, and they find the sifting of these seeds seems to be a very great help.

Prof. Myers.—We did not grade our cabbage seed according to weight, but according to size, and there was no material difference in regard to the crop. Possibly in regard to the light and heavy seeds there might be some difference.

Prof. Surface.—It may be of interest to know that our Lancaster County farmers are blowing their tobacco seeds, with excellent results, by means of a glass tube, blowing away the light seeds, and using the heavy seeds.

If any man thinks the farmer does not have to know a little bit of everything, just let him try farming. There is no man who really does learn as much as the farmer. Just come here and look at the speakers at this meeting, and see the improvement over last year. The farmer, to keep abreast of the times has to be "going some."

Our Lancaster County men may be proverbial for their slowness, but they always "get there."

Mr. Garrahan.—I cannot see the necessity of cussing out the seedsmen on this question of tomato seeds. It is simply a matter of going through a man's tomato field, selecting the best specimens for seed, putting them into a barrel for a few days until they begin to ferment and then taking the seed out and drying it. It is only a little work. The same thing holds good in cabbage seed. It is easy enough to raise your own seed.

The President.—You have all heard the Houser Cabbage referred to? Mr. Houser has a farm near mine. He started out as a farm hand. After he came of age and wanted to get married, he started out for himself. He had no agricultural or horticultural education, but after he had been farming for a few years, he saw the necessity of paying particular attention to his seeds. Cabbage and tomatoes have been his two main crops for twenty years, and he has been selecting his very best heads and saving the seed from them for planting. Holmes came up there one day and saw a four-acre patch of cabbage; it was the most uniform patch he ever saw. Houser is said to raise four thousand heads to the acre. Holmes got Houser to raise some seed for him, and instead of giving it its proper name, he put his own name to it. It is the same way with pure seed. If the farmer won't buy from the seedsman who gives poor seed, the seedsmen will have to go out of business.

Prof. Myers.—I want to agree with the President in regard to the selection of seed. Of course, there are some farmers who raise their seed, but with most of them, they do not take the time, or it is too much trouble, or not worth while to do it. But it is worth while to take care of your good seed; it is so much better than the seed you buy. On the whole, I think the seedsmen are as good a lot of men as any other, but the sooner the farmer insists upon getting a good quality of seeds, the better it will be for the seedsman and for the farmer. The matter of selling a few pounds of seed is a small thing to the seedsman, but to the farmer it means a great deal. Any seedsman worthy of the name will, of course, try to have the best seed he can get, but the sooner the farmer insists on only the best quality, the better it will be for both.

Then another word as to variety: Don't try to get too many varieties; they never do so well. Take one or two varieties, and keep them pure.

Prof. Tompson.—We are doing some more experiment work at the Station on Peas. It was done at first from a purely scientific standpoint, but the results were such that it was determined to continue them from a practical standpoint. The pea vines are counted, with the number of pods, and also the number of peas. On some vines you will find two pods, and on others ten or twelve, and where there are more pods to the vine, there are more peas to the pod.

If this thing can be carried out it will be of great importance; it will develop a great field of work along this line.

The President.—Can you increase the number of pods by selection?

Prof. Tompson.—No; we have not been working along that line. It is a point that has come out subsequently to the general work. The general work has been to determine the matter of heredity in the pea. The results as figured out seem to indicate that there is great opportunity along this line.

Prof. Myers.—In selecting seed, tomato for instance, we should take into consideration the character of the plant as a whole, rather than the individual fruit. If you take the individual fruit you are likely to be disappointed. We must take into consideration the vitality of the plant as a whole, rather than take the individual from a vine that bears only one or two tomatoes.

Mr. Garrahan.—I would like to ask the professor if he knows any seedsmen selecting seed along that line?

Prof. Myers.—I don't know just along that line, but one firm —Landreth's,—are trying to select seed, and claim to be getting better results from it.

Mr. Garrahan.—Now, is it not a fact that most of the tomato seed is gotten by taking the entire crop, running it through a separator at the cannery, and then selling the seed?

Prof. Myers.—I agree with that; I simply made a few remarks to show the farmer that it is in the selection of seed that results lie. It is much easier to take time to select from the hill, than to select from the fruit after it is picked.

The imporance of selecting seed in the hills has been demonstrated in Wisconsin in the matter of the selection of potatoes for seed. The selection of potatoes from hills has been followed on the principle of the strain of prolific yields of certain potatoes, the same as that strains run in human families. Select your seeds from the prolific plants. I would not select tomato seeds from the basket of tomatoes; get them from the hills, where you can study the plant. I want blood and parentage in the plant as well as in the animal.

The President.—It is getting late, and if there are no further remarks, the Secretary has a matter he would like to bring before the meeting.

The Secretary.—The matter I wish to bring before the meeting is in reference to the bill regulating the insecticides on the market. There was no action on it during the meeting of the last Legislature, but it is likely that the matter will come up again in the Legislature

this year. I move, therefore, that we endorse the bill as it was presented to the last Legislature.

Prof. Surface.—I second it.

This motion was carried in the regular way.

The President.—We were very delightfully entertained by the ladies of the local Grange on the first evening. I understand that the Master of the local Grange, Mr. Benson, is in the room, and I would like to have a word from him.

Mr. Benson.—Mr. Chairman, I thank you for the honor of giving me a word to say for the Grange. It is a matter of surprise to a Granger to be called on, on an occasion like this. A man who belonged to our Grange a year ago said the Grange was worth a great deal to him, but he was worth nothing to the Grange. Now, you people are worth a great deal to the Grange, but the Grange is worth nothing to you.

The President.—We don't agree with you.

Mr. Benson.—We feel very grateful that this meeting came to Tunkhannock, and we feel that we have all been benefitted by it. I have listened to the remarks at the meetings here and have derived a great deal of good from them. I have listened to the remarks here, and I have not heard but one mistake made, and I don't believe the President is responsible for that. There is a gentleman here, who should have been called on in my place. I have not been master of the Grange very long, but this gentleman has been master of the Grange for some time, and stands very high in every other respect. I refer to the Hon. Stanley Brunges. If you had been introduced to him you would not have called on me. I have only been master of the Grange for about a week. I thank you for bringing this meeting up to little Wyoming County, and also thank you for the honor and generosity that has been shown the Tunkhannock Grange through me.

The President.—I don't admit that the President has made a mistake in calling on the master of the Grange. We have already been introduced to Mr. Brunges, and have had the pleasure of listening to an address from him. We shall, however, be pleased to hear from him again.

Mr. Brunges.—Mr. President, I think you have heard all you want of me, but I want to say that the master of the Grange is not as innocent as he appears. He has been master of the Grange before this year, and also of the Pomona Grange of the County.

The President.—I understand now why he was so anxious for some one else to speak.

Is the Committee on Resolutions ready to report?

The Committee on Resolutions, through Mr. R. J. Walton, presented the following report:

REPORT OF THE COMMITTEE ON RESOLUTIONS.

Your Committee on Resolutions beg to report as follows:

WHEREAS, We the members of the State Horticultural Association assembled, believing that this has been one of the best meetings in the history of the organization, desire to express our appreciation to all who have in any way contributed to its success. Therefore be it

Resolved, That we do hereby tender special thanks to the ladies of the Tunkhannock Grange for their efficient services in connection with the banquet; to the commissioners of Wyoming County for the use of the Court House, to the local committee of arrangements for their untiring efforts, to the representatives of the press, who have reported our proceedings, and especially to the Philadelphia North American, who have sent their Pennsylvania State editor to our meeting, assuring a full and correct report of our proceedings; to visiting speakers from a distance, who have rendered so much valuable service, in the line of instruction, and to the burgess and citizens of Tunkhannock for the many courtesies extended.

WHEREAS, The value and success of our annual meetings depend largely upon the character of the display of fruits and other horticultural products, be it

Resolved, That this Association endeavor to offer such premiums at the next annual meeting as may seem proper to the executive committee.

WHEREAS, The orchard experiments as conducted by Prof. J. P. Stewart, of the Pennsylvania State College, promise results of very great value to the fruit growers of this State, be it

Resolved, That this Association express its appreciation of these investigations and urge their continuance as long as may be necessary to arrive at definite and positive conclusions.

WHEREAS, There are many unsolved problems connected with the culture of peaches, pears, plums and cherries, be it

Resolved, That this association request the State Experiment Station to institute experiments with such of those fruits as seem to promise results of greatest value to the fruit growers of Pennsylvania.

Believing that a parcels post would serve a large public interest through the development of its possibilities along the line of bringing the producer and consumer into closer relations this Association declares itself as favoring the speedy enactment of such a law and as both political parties have declared in favor of the parcels post;

Resolved, That the Association urges its members to use every effort possible to secure the speedy redemption of the promises made.

In view of the growing interest in horticultural matters upon the part of this State your committee recommends the appointment of a committee to consider possible lines of publicity of a sort beneficial to the Association as a body and the members as individuals.

WHEREAS, This Association has profited greatly by the special appropriation of $1,000 for two years secured from the State through the efforts of our worthy Secretary of Agriculture, Hon. N. B. Critchfield, be it

Resolved, That we express our appreciation of this financial support and request that a similar or larger sum be appropriated to the association for its work in the future.

WHEREAS, Providence in His Almighty wisdom, has removed from our rank, one of our honored ex-presidents, Mr. Calvin Cooper, of Bird-in-Hand, Lancaster County; also one of our active members and successful fruit grower, W. H. Swartwood, be it

Resolved, That this Association express its deep sense of loss and extend to the bereaved families its sympathy.

Signed,

R. L. WATTS.
T. C. FOSTER.
R. J. WALTON.

Mr. Fox.—I move the adoption of these resolutions.

This motion having been properly seconded, was regularly carried in the usual way.

The President.—Any further business?

Mr. Fox.—What is to become of the fruit that has been on exhibition?

The President.—A portion of that fruit is going to be placed in storage and then exhibited at Philadelphia at the meeting of the Stock Breeders' Association, and the Dairy Union there in February. Mr. Tyson is going to take charge of it. The exhibit of the Adams County Society and that of Perry and Bedford Counties have been offered for this purpose, and if there is any fruit from Cambria County in proper condition, it is also to be used.

The President.—Is there any further business?

Mr. Fox.—I move we adjourn.

Mr. Engle.—I second the motion.

This motion was regularly carried, and the Fifty-first Annual Meeting adjourned.

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PROCEEDINGS

of the

Fifty-second Annual Meeting

of the

State Horticultural Association

of Pennsylvania

Held in

Harrisburg, Pa., January 24, 25, 26, 1911

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1911

State Horticultural Association of Pennsylvania

Officers for 1911

PRESIDENT.

Gabriel Hiester, Harrisburg.

VICE-PRESIDENTS.

Hon. Wm. T. Creasy, Catawissa; Robert M. Eldon, Aspers; F. H. Fassett, Meshoppen.

SECRETARY. TREASURER.

Chester J. Tyson, Flora Dale. Edwin W. Thomas, King of Prussia.

VICE PRESIDENTS FROM COUNTY ASSOCIATIONS.
(Presidents of County Associations for current year.)

Adams, Robert M. Eldon; *Bedford,* A. C. Richards; *Erie,* Geo. W. Blaine; *Luzerne,* W. J. Lewis; *Perry* Wm. Stewart; *Somerset,* D. B. Zimmermann. Several Counties not heard from in time to print.

EXECUTIVE BOARD.

All the above named officers.

COMMITTEES IN CHARGE OF 1911 MEETING.

Committee of Arrangements.

E. B. Engle, Harrisburg; L. M. Myers, Siddonsburg; H. H. Snavely, Willow Street; C. A. Wolfe, Aspers; J. L. Rife, Camp Hill.

Reception Committee.

R. J. Walton, Hummelstown; Dr. I. H. Mayer, Willow Street; H. C. Snavely, Cleona; J. D. Herr, Harrisburg; W. H. Stout, Pine Grove.

Revision of Constitution, to Confer with Executive Committee.

Edwin C. Tyson, Flora Dale; W. J. Lewis, Pittston; A. D. Strode, West Chester.

In Charge of Exhibits.

W. J. Wright, Chairman, State College;
E. P. Garrettson, Biglerville; P. S. Fenstermacher, Allentown; H. C Baker, Tunkhannock; A. C. Richards, Schellsburg; Abram Hostetler, Johnstown; Ross F. Lee, Somerset; Calvin P. Scholl, Halifax; James A. Patterson, Stewartstown.

STANDING COMMITTEES FOR 1911.

Legislative Committee.

William T. Creasy, Catawissa; Howard G. McGowan, Geigers Mills; Levi M. Myers, Siddonsburg.

Exhibition Committee.

Prof. W. J. Wright, *Chairman,* State College.
Ward C. Pelton, North Girard; Chas. A. Wolfe, Aspers;
John B. McClelland, Canonsburg; R. H. Garrahan, Kingston.

General Fruit Committee.

John D. Herr, *Chairman,* Harrisburg.

Membership in this Committee is composed of one member from each County represented in the Association. Other members have assisted with the reports in some of the more important fruit counties, three or four taking part in the work.

Membership and Expansion Committee.

One member from each County in the State showing horticultural activity.

MEMBERSHIP

Life Members

NAME.	POST OFFICE.	COUNTY.
Anderson, H. W.,	Stewartstown,	York.
Atwater, Richard M.,	Chadds Ford,	Chester.
Barlow, Thos. W.,	Fort Washington,	Montgomery.
Boltz, Peter R.,	Lebanon,	Lebanon.
Boyer, John, F.,	Middleburg,	Snyder.
Blaine, Geo. W.,	North East,	Erie.
Brinton, William P.,	Christiana,	Lancaster.
Chase, Chas. T.,	Devon,	Chester.
Chase, Howard A.,	Union League,	Philadelphia.
Creasy Hon. William T.,	Cattawissa,	Columbia.
Crouse, E. A.,	Gettysburg,	Adams.
Cummings, Jos. F.,	Sunbury,	Northumberland.
Dill, Robert,	North East,	Erie.
Eldon, Robert M.,	Aspers,	Adams.
Engle, Enos B.,	Harrisburg,	Dauphin.
Engle, John G.,	Marietta,	Lancaster.
Fox, Cyrus T.,	Harrisburg,	Dauphin.
Garrettson, Joel V.,	Aspers,	Adams.
Good, C. W.,	Waynesboro,	Franklin.
Grove, W. E.,	York Springs,	Adams.
Haddock, John C.,	Wilkes-Barre,	Luzerne.
Hartman, D. L.,	Little River, Florida	
Hartman, Geo. R.,	Biglerville,	Adams.
Hartman, L. E.,	Etters,	York.
Heard, R. E.,	Buffalo, New York	
Hiester, Gabriel,	Harrisburg,	Dauphin.
Hoopes, Abner,	West Chester,	Chester.
Hostetler, Abram,	Johnstown,	Cambria.
Huff, L. B.,	Greensburg,	Westmoreland.
Huff, Burrell R.,	Greensburg,	Westmoreland.
Hull, D. W.,	Waymart,	Wayne.
Jones, S. Morris,	West Grove,	Chester.
Keller, H. M.,	Gettysburg, Route 5,	Adams.
Landis Israel,	Lancaster,	Lancaster.
Loop, A. I.,	North East,	Erie.
Martin, J. O.,	Mercersburg,	Franklin.
McCormick, James,	Harrisburg,	Dauphin.
McFarland, J. Horace,	Harrisburg,	Dauphin.
McLanahan, T. King,	Hollidaysburg,	Blair.
Meehan, S. Mendelson,	Germantown,	Philadelphia.
Mitchell, Ehrman B.,	Harrisburg,	Dauphin.
Myers, Levi M.,	Siddonsburg,	York.
O'Connor, Haldeman,	13 N. Front St., Harrisburg,	Dauphin.
Pannebaker, Wm. M.,	Virgilina, Virginia	
Reist, John G.,	Mt Joy,	Lancaster.
Rick, John,	Reading,	Berks.
Satterthwaite, Fred'k., G.,	Fallsington,	Bucks.
Scribner, Prof. F.Lamson,	Knoxville, Tenn.,	
Shaffner, Jacob,	Harrisburg,	Dauphin.
Sharpe, Miss E. M.,	Accotink, Virginia	
Snavely, H. H.,	Willow Street,	Lancaster.
Stem, Dr. J. C.,	Lemovne,	Cumberland.
Thomas Edwin W.,	King of Prussia,	Montgomery.
Tyson, Chester J.,	Flora Dale,	Adams.
Tyson, Edwin C.,	Flora Dale,	Adams.
Tyson, Wm. C.,	Guernsey,	Adams.
Van Deman, H. E.,	3630 13 St., N.W., Washington, D.C.	
Wertz, D. Maurice,	Waynesboro,	Franklin.
Wertz, George M.,	Johnstown,	Cambria.
Woods, Edw., A.,	Frick Building, Pittsburg,	Allegheny.
Youngs, L. G.,	North East,	Erie.

Annual Members for 1911

A.

NAME.	POST OFFICE.	COUNTY.
Adams, R. M.,	Lancaster,	Lancaster.
Adams. W. S.,	Aspers,	Adams.
Allen, Carl G.,	Williamsport,	Lycoming.
Allen, W. C.,	Tunkhannock, Route 3,	Wyoming.
Anderson, Jos. W.,	Stewartstown,	York,
Anderson, H. M.,	New Park,	York,
Andrews, J. B.,	Roanoke, Virginia	
Anwyll, Harry L.,	Harrisburg,	Dauphin.
Arny, J. J.,	Centre Hall,	Centre.
Arny, L. Wayne,	New Britain,	Bucks.
Ashenfelter, Horace,	Royersford,	Montgomery.
Atha, S. H.,	Beaver,	Beaver.
Atwater, C. G..,	17 Battery Place, New York, N. Y.,.	

B.

Bailey. J. I.,	Baker Summit,	Bedford.
Baird, A. T.,	Island,	Clinton.
Baird, Wm. H.,	Center Hall,	Centre,
Baker, H. C.,	Tunkhannock,	Wyoming.
Banks, William,	Mifflintown,	Juniata.
Banks, M. H.,	Siddonsburg,	York.
Banzhaf, W. H.,	Muncy,	Lycoming.
Barclay, R. D.,	424 S 40th St., Philadelphia,	Philadelphia.
Barnard, C. P.,	North Brook,	Chester.
Barnes, Wade H.,	Brooklyn,	Susquehanna.
Barnhart, Albert,	Annville,	Lebanon.
Bartram, Geo. H.,	West Chester, Route 5,	Chester.
Baugher, H. G.,	Aspers,	Adams.
Baughman, F. E.,	Manor,	Westmoreland.
Beachy, N. C.,	Allentown,	Lehigh.
Behrhorst, C. E.,	613 Orchard St., Avalon,	Allegheny.
Bell, Robert Harry,	State College,	Centre.
Bell, James A.,	Canonsburg, Route 4,	Washington.
Belt, J. E.,	Wellsville,	York.
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Bertolet, Israel M.,	Oley,	Berks.
Black, William H.,	Flora Dale,	Adams.
Blessing, David S.,	4 N. Court St., Harrisburg,	Dauphin.
Blythe, F. H.,	State College,	Centre.
Boland, Thomas E.,	Swarthmore,	Delaware.
Bolton, William P.,	McCall Ferry,	Lancaster.
Bostwick, D. C., and Son,	North East,	Erie.
Bourne, J.,	North East,	Erie.
Bowen, E. T.,	Springbrook,	Lackawanna.
Bower, A. D.,	Linglestown,	Dauphin.
Bowers, E. C.,	East Petersburg,	Lancaster.
Boyd, J. C.,	Guys Mills,	Crawford.
Boyer, W. W.,	Arendtsville,	Adams.
Brashear, Walter,	West Fairview,	Cumberland.
Bream, H. J.,	Aspers,	Adams.
Bream, Samuel,	Biglerville,	Adams.
Brenneman, J. W.,	Willow Street,	Lancaster.
Briggs, J. S.,	Norristown,	Montgomery.
Brinton, S. L.,	West Chester,	Chester.
Brinton, William,	Timicula,	Chester.
Brodbeck, A. R.,	Hanover,	York.
Brooke, R. G.,	Schwenksville,	Montgomery.
Brown, M. B.,	North East,	Erie.
Brownback, Jesse Taylor,.	West Chester, Route 6,	Chester.
Brunges, Hon. Stanley, ..	Tunkhannock,	Wyoming.
Brunges, Howard F.,	Tunkhannock,	Wyoming.

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Bucher, Dr. I. Reily,	Lebanon,	Lebanon.
Buckwalter, J. T.,	Lancaster,	Lancaster.
Buckwalter, Harry,	Norristown, R. D.,	Montgomery.
Buckwalter, Silas K.,	Lancaster, Route 8,	Lancaster.
Bullock, W. H.,	Honesdale, Route 3,	Wayne.
Burgess, Nelson W.,	Wyoming,	Luzerne.
Burke, Paul H.,	Reading,	Berks.
Bullers, A. J.,	Brookville, Route 6,	Jefferson.
Butt, G. Will,	North East,	Erie.

C.

Campbell, W. J.,	Honey Grove,	Juniata.
Canfield, H. A.,	19 Potter St., Bradford,	McKean.
Card, Fred W.,	Sylvania,	Bradford.
Carpenter, C. J., Jr.,	50 Church St., New York, N. Y.,	
Cassels, Frank,	Kersey,	Elk.
Catchpole, Geo. C.,	North Rose, N. Y.	
Chambers, Alfred H.,	938 Pear St., Reading,	Berks.
Chandler, W. H.,	Scranton,	Lackawanna.
Chandler, W. H., Jr.,	Scranton,	Lackawanna.
Chapin, Irvin,	Shickshinny,	Luzerne.
Christman, F.,	Sellersville,	Bucks.
Christman, J. M.,	Fort Hunter,	Dauphin.
Claar, William,	Queen,	Bedford.
Clark, R. S.,	Dillsburg,	York.
Clegg, William S.,	New Bloomfield,	Perry.
Clemson, J. W.,	Halifax,	Dauphin.
Clouse, W. H.,	414 Shaw Ave., McKeesport,	Allegheny.
Clouser, S. L.,	Inglenook,	Dauphin.
Clovis, A. E.,	Jollytown,	Greene.
Cochran, J. W.,	Canonsburg, Route 5,	Washington.
Cocklin, B. F.,	Mechanicsburg, No. 2,	Cumberland.
Cocklin, E. H.,	Siddonsburg,	York.
Cocklin, J. A.,	Siddonsburg,	York.
Collins, S. C.,	Bainbridge,	Lancaster.
Conley, H. D.,	Etters, Route 2,	York.
Coray, W. H.,	Pittston, Route 1,	Luzerne.
Corson, H. H.,	Avondale,	Chester.
Coursen, I. H.,	Wyoming,	Luzerne.
Couse, Norman W.,	North East,	Erie.
Cox, J. W.,	New Wilmington,	Lawrence.
Crawford Bros.,	North East,	Erie.
Crawford, J. B.,	Fayetteville,	Franklin.
Critchfield, Hon. N. B.,	Harrisburg,	Dauphin.
Croyle, Robert,	Johnstown, Route 4,	Cambria.
Cumbler, H. B.,	Logania,	Perry.
Curstead, N. B.,	Oliphant Furnace,	Fayette.

D.

Davenport, Eugene,	578 W. Main St., Plymouth,	Luzerne.
Davenport, Geo. F.,	578 W. Main St., Plymouth,	Luzerne.
Davis, Wm. H. H.,	West Chester, Route 7,	Chester.
Davison, C. M.,	Chambersburg,	Franklin.
Deardorff, J. A.,	Cashtown,	Adams.
Deming, Co.,	Salem, Ohio	
Demming H. C.,	Harrisburg,	Dauphin.
Denehey, W. R.,	1423 N. Front St., Harrisburg,	Dauphin.
Denlinger, Amos B.,	Strasburg, Route 1,	Lancaster.
Detweiler, D. Z.,	Belleville,	Mifflin.
Detwiler, William P.,	Phoenixville,	Chester.
Dewitt, J. A.,	Falls,	Wyoming.
DeWitt, H. L.,	Riverside,	Northumberland.
Dickenshied, Fred S.,	Zionsville,	Lehigh.
Dickson, Mrs. Jas. P.,	Dalton,	Lackawanna.
Diggory, R. J.,	300 Walnut St., Kingston,	Luzerne.
Downing, Lewis R.,	Downingtown,	Chester.
Dulles, John W.,	West Chester,	Chester.

NAME.	POST OFFICE.	COUNTY.
Duncan, P. F.,	Duncannon,	Perry.
Dunlap, R. Bruce,	State College,	Centre.
Durell, Chas. A.,	Reading,	Berks.
Dusman, W. F.,	Hanover,	York.

E.

Eastman, Jas. E.,	Rome,	Bradford.
Ebert, Carl,	Holmsburg,	Philadelphia.
Edmonds, J. R.,	Hagerstown, Md.,	
Eicholz, Henry,	Waynesboro,	Franklin.
Elder, Irvin C.,	Chambersburg,	Franklin.
Ellis, David M.,	Bridgeport,	Montgomery.
Ellsworth, J. E.,	Erie, Route 2,	Erie.
Emerson, J. B., M.D.,	40 E. 41st St., New York, N. Y.,	
Emmons, Myron,	Rolfe,	Elk.
Engle, Ezra, B.,	Marietta,	Lancaster.
Erk, George,	Seeleyville,	Wayne.
Eslinger, Samuel L.,	Lemoyne,	Cumberland.
Espenshade, F. L.,	Refton,	Lancaster.
Estabrook, F. L.,	Athens,	Bradford.
Everhart, Geo. W.,	York,	York.

F.

Fassett, C. B.,	Mehoopany,	Wyoming.
Fassett, F. H.,	Meshoppen,	Wyoming.
Fassett, Wallace,	Mehoopany,	Wyoming.
Felix, Geo. C.,	Salix,	Cambria.
Felty, G. B. O.,	Millersville,	Lancaster.
Fenstermacher, P. S.,	Allentown,	Lehigh.
Fernald, Geo. H.,	North East,	Erie.
Fertig, F. R.,	Lebanon,	Lebanon.
Fincken, Maurice F.,	5027 Florence Ave., Philadelphia,	Philadelphia.
Finn, A. O.,	Clifford,	Susquehanna.
Flinchbaugh, F. T.,	York,	York.
The Florex Gardens,	North Wales,	Montgomery.
Forry, Laroy S.,	Spring Forge,	York.
Forsyth, Samuel,	Jarretttown,	Montgomery.
Foster, T. C.,	Winfield,	Union.
Frantz, S. P.,	Luzerne,	Luzerne.
Frear, Edgar C.,	Factoryville,	Wyoming.
Frederick, T. J.,	Springchurch,	Armstrong.
Freed, A. J.,	Racine,	Butler.
Freed, W. A.,	Racine, Route 2,	Butler.
Fridy, R. M.,	Mountville,	Lancaster.
Fromuth, Harry C., Jr.,	Southampton,	Bucks
Fulton, H. R.,	State College,	Centre.

G.

Gammel, Emerson W.,	Honesdale,	Wayne.
Gardner, L. M., Jr.,	York Springs,	Adams.
Garrahan, R. H.,	Kingston,	Luzerne.
Garrettson, Eli P.,	Biglerville,	Adams.
Garrettson, Frank,	Aspers,	Adams.
Garretson, Robert,	Flora Dale,	Adams.
Gaston, W. F.,	Downingtown,	Chester.
Gay, Arthur,	Pittston, Route 1,	Luzerne.
Gelder, Chas. C.,	218 S. 38th St., Philadelphia,	Philadelphia.
Gibson, Bruce A.,	State College,	Centre.
Gibson, Ralph,	Williamsport,	Lycoming.
Gillespie, J. Frank,	Canonsburg, Route 3,	Washington.
Gilpin, Vincent,	West Chester,	Chester.
Good, Adam E.,	Gap, Route 1,	Lancaster.
Good, Martin R.,	Blue Ball,	Lancaster.
Gooderham, H. M.,	Patton,	Cambria.
Gorham, W. R.,	Muncy,	Lycoming.
Graper, A. W.,	96 Diamond Market, Pittsburg,	Allegheny.

NAME.	POST OFFICE.	COUNTY.
Graybill, I. B.,	Refton,	Lancaster.
Green, C. A.,	44 Alumni Ave., Providence, R. I.,	
Green, James, Jr.,	Creighton,	Allegheny.
Grieb, C. B.,	Mill Hall,	Centre.
Griest, A. W.,	Flora Dale,	Adams.
Griest, C. A.,	Guernsey,	Adams.
Griest, C. S.,	Guernsey,	Adams.
Griest, Frederick E.,	Flora Dale,	Adams.
Griest, Geo. G.,	30 Church St., New York, N. Y.,	
Griest, Maurice E.,	105 W. 163 St., New York, N. Y.,	
Gross, W. E.,	Gibsonia,	Allegheny.
Guise, D. H.,	Emmittsburg, Md.,	
Gulden, Harry,	Aspers,	Adams.

H.

Hahne, Frank,	Dubois,	Clearfield.
Haines, Miss Mary M.,	Cheltenham,	Montgomery.
Hall, L. C	Avonia,	Erie.
Harbold, Isaac,	Wellsville,	York.
Harman, T. D.,	Pittsburg,	Allegheny.
Harris, Philip,	Light Street,	Columbia.
Harrison & Sons, J. G.,	Berlin, Md.	
Harrold, William H.,	Greensburg, Route 2,	Westmoreland.
Harshman, U. W.,	Waynesboro,	Franklin.
Hartman, G. W.,	Marysville,	Perry.
Hartman, William,	Etters,	York.
Hassler, E. O.,	Linglestown,	Dauphin.
Haverstick, Paul E.,	Lancaster,	Lancaster.
Hawkins, E. B.,	York,	York.
Hayes, Dr. Robt. G. H.,	Bellefonte,	Centre.
Hazard, Willis H.,	West Chester,	Chester.
Heilman, R. P.,	Emporium,	Cameron.
Henning, J. C.,	North Mehoopany,	Wyoming.
Hepler, J. R.,	State College,	Centre
Herr, Daniel D.,	Lancaster,	Lancaster.
Herr Frank H.,	Millersville,	Lancaster.
Herr, John D.,	Lancaster,	Lancaster.
Hershey, C. A.,	Tillie,	Adams.
Hershey, H. F.,	State Colllege,	Centre.
Hershey, H. S.,	East Petersburg,	Lancaster.
Heyser, William,	Guldens,	Adams.
Hibshman, Geo.,	Ephrata,	Lancaster.
Hill, William D.,	North East,	Erie.
Hilton, H. R.,	Port Allegany,	McKean.
Hinkle, Horace,	York,	York.
Hoffman, Willis H.,	Biglerville,	Adams.
Holmes, H. L.,	0 N 2nd St., Harrisburg,	Dauphin.
Hopkins, H. D.,	Mountville,	Lancaster.
Horton, Harry H.,	Sheffield,	Warren.
Howard, Josiah,	Emporium,	Cameron.
Howe, Homer B.,	Wellsboro,	Tioga.
Huff, B. P.,	Roanoke, Virginia,	
Hummel, P. T.,	631 Maclay St., Harrisburg,	Dauphin.
Hutchinson, R. H.,	51 Front St., New York, N. Y.,	
Hyde, A. A.,	Manns Choice,	Bedford.

I.

Ide, S. C.,	Alderson,	Luzerne.

J.

Jacob, P. A.,	Wellsburg, W. Va.,	
Jacobs, Samuel,	Gettysburg, Route 5,	Adams.
Jacques, Mrs. Elizabeth H.,	Germantown,	Philadelphia.
Jarden, C. P.,	Delaware Ave. & Chestnut St., Phila.,	Philadelphia.
Johnston, C. B.,	North Warren, Box 82,	Warren.
Johnson, Howard M.,	Catawissa,	Columbia.

NAME.	POST OFFICE.	COUNTY.
Johnson, J. H.,	Wilcox,	Elk.
Jones, A. A.,	1810 Jefferson St., Philadelphia,	Philadelphia.
Jordan, J. H.,	811 Bessemer Bldg., Pittsburg,	Allegheny.

K.

Kane, J. A.,	Biglerville,	Adams.
Kauffman, Chas.,	Stony Brook,	York.
Kauffman, E. F.,	York, Route 3,	York.
Keeny, W. D.,	Manheim,	Lancaster.
Keeny, A. C.,	Laceyville,	Wyoming.
Keeny, Fred, B.,	Laceyville,	Wyoming.
Keifer, A. M.,	Greenville,	Mercer.
Kell, Reuben H.,	Blain,	Perry.
Kemp, Miss Mary V.,	613 N. 8th St., Philadelphia,	Philadelphia.
Kennedy, F. W.,	Franklin,	Venango.
Kepple, Clarence L.,	Leechburg, Route 3,	Armstrong.
Kernan, William,	Dushore,	Sullivan.
Kester, R. P.,	Grampian,	Clearfield.
Ketchum, E. M.,	North East,	Erie.
Kidder, O. S.,	North East,	Erie.
Kilmer, A. B.,	Springbrook,	Lackawanna.
Kimmel, A. F.,	Orwigsburg,	Schuylkill.
Kirsch, A. B.,	Nicktown,	Cambria.
Kleinfelter, U. S.,	Biglerville,	Adams.
Klock, W. J.,	Pitman,	Schuylkill.
Kloss, D. S.,	Tyrone,	Blair.
Klussman, F. C.,	Millvale,	Allegheny.
Knuppenburg, D. A.,	Lake Carey,	Wyoming.
Koons, Dr. P. R.,	Mechanicsburg,	Cumberland.
Koser, G. W.,	Biglerville,	Adams.
Krady, W. S.,	Mt. Joy,	Lancaster.
Kraybill, S. S.,	Mt. Joy, Route 1,	Lancaster.
Kreibel, Rev. O. S.,	Pennsburg,	Montgomery.
Krewson, James,	Cheltenham,	Montgomery.
Krug, H. G.,	205 S McKean St., Butler,	Butler.
Kunkel, Jonas,	New Ringgold,	Schuylkill.
Kunkel, N. J.,	New Ringgold,	Schuylkill.

L.

Lance, John H.,	Kingston,	Luzerne.
Large, Miss Katherine,	Orrtanna,	Adams.
Larner, John B.,	1709 19th St., Washington, D. C.,	
Lau, Rev. D. B.,	Hanover,	York.
Laub, H. H., Jr.,	Lewistown,	Mifflin.
Lawrence, H. A.,	Sunbury, Route 2,	Northumberland.
Lawrence, J. P.,	Sunbury,	Northumberland.
Lawver, Rufus,	Biglerville,	Adams.
Lee A. C.,	Waymart,	Wayne.
Lee, R. F.,	Somerset,	Somerset.
Leet, C. E.,	North East,	Erie.
LeFevre, T. C.,	5104 Brown St., Philadelphia,	Philadelphia.
Lehman, A. S.,	Chambersburg,	Franklin.
Leighton, Jas. G.,	Tunkhannock,	Wyoming.
Leonard, Frank E.,	Carlisle Springs,	Cumberland.
Lerch, Fred,	Scobeyville, N. J.,	
Leslie, William H.,	Arnold, Route 1,	Westmoreland.
Lewis, Bradley W.,	Tunkhannock,	Wyoming.
Lewis, E. P.,	Temple, Route1,	Berks.
Lewis, H. G.,	Pittston, Route 1,	Luzerne.
Lewis, W. J.,	Pittston,	Luzerne.
Lick, Simon,	Marysville,	Perry.
Lightner, William A.,	Landisburg,	Perry.
Limbert, Benj.,	Spring Mills,	Centre.
Lincoln, Geo. H.,	410 Wheeler Ave., Scranton,	Lackawanna.
Lisle, R. Mason,	Paoli,	Chester.
Livezy, Albert,	Springbrook,	Lackawanna.
Lohman, Karl B.,	State College,	Centre.

NAME.	POST OFFICE.	COUNTY.
Loomis, Edw.,	North East,	Erie.
Lord, John,	Wyoming, Route 1,	Luzerne.
Lott, J Kerr,	Gettysburg,	Adams.
Lotz, A. G.,	1610 S. 4th St., Philadelphia,	Philadelphia.
Loucks, E. S.,	Soudertown,	Montgomery.
Love, B. D.,	Erie, Route 2	Erie.
Lowe, M. J.,	Bradford,	McKean.
Luke, W. J.,	Morganza,	Washington.
Lupp, R. M.,	Biglereville, Route 2,	Adams.
Lushen, A. F.,	Venetia, Route 2,	Washington.

M.

MacAskie, K. G.,	1648 Adams Ave., Scranton,	Lackawanna.
Mackintosh, R. S.,	State College,	Centre.
Macneal, William P.,	Parkesburg,	Chester.
MacVeagh, Walter F.,	Williamsport,	Lycoming.
Maffet, Miss M. A.,	264 S. Franklin St., Wilkes-Barre,	Luzerne.
Maloney Bros. & Wells,	Dansville, N. Y.	
Martin, A. L.,	Harrisburg,	Dauphin.
Masters, A. S.,	Pittston,	Luzerne.
Mayer, Dr. I. H.,	Willow Street,	Lancaster.
McAllen, R. W.,	Fannettsburg,	Franklin.
McBride, C. G.,	State College,	Centre.
McCaleb, William B.,	Harrisburg,	Dauphin.
McCanna, Francis J.,	Falls,	Wyoming.
McClelland, J. B.,	Canonsburg,	Washington.
McClure, F. L.,	New Wilmington,	Lawrence.
McCord, William C.,	Mendenhall,	Chester.
McDonald, James, A.,	North East,	Erie.
McDonald, I. M.,	North East,	Erie.
McGowan, Howard G.,	Geigers Mills,	Berks.
McKay, Geo. H.,	1118 Arch St., Philadelphia,	Philadelphia.
McKnight, W. J.,	Girty,	Armstrong.
McLain, J. A.,	Allenport,	Washington.
McLaughlin, Jos. M.,	North East,	Erie.
McMurray, Levi A.,	Canonsburg, Route 4,	Washington.
McSparran, W. F.,	Furniss,	Lancaster.
McWilliams, H. C.,	State College,	Centre.
Meisenhelder, R. N.,	Hanover,	York.
Menger, G. A.,	Factoryville,	Wyoming.
Metzger, S. S.,	Bedford,	Bedford.
Michael, J. E.,	Norristown, Route 3,	Montgomery,
Michell, Henry F.,	518 Market St., Philadelphia,	Philadelphia.
Miller, Albert,	Lebanon, Route 10,	Lebanon.
Miller, A. Kent,	Somerset,	Somerset.
Miller, Edw. J.,	Leetsdale, Box 37,	Allegheny.
Miller, H. A.,	Williamsport,	Lycoming.
Miller, Maris T.,	Kennet Square,	Chester.
Miller, Norman,	Marion,	Franklin.
Minter, D. G.,	Gettysburg, Route 5,	Adams.
Moon, James M.,	616 Stephen Girard Bldg., Phila.,	Philadelphia.
Moon, William H.,	Morrisville,	Bucks.
Moore, Benj. S.,	Culpsville,	Bucks.
Moorehead, E. T.,	North East,	Erie.
Moorehead, J. A.,	Mooreheadville,	Erie.
Moorehead, R. J.,	North East,	Erie.
Mottier, C. H.,	North East,	Erie.
Murphy, S. I.,	Wawa,	Delaware.
Murray, D. E.,	Catawissa,	Columbia.
Musselman, C. H.,	Biglerville,	Adams.
Musser, Will M.,	Lampeter,	Lancaster.
Myers, C. E.,	Ithaca, N. Y.,	
Myers, Geo. P.,	Biglerville,	Adams.
Myers, Harry C.,	Siddonsburg,	York.
Myers, John R.,	Siddonsburg,	York.

N.

NAME.	POST OFFICE.	COUNTY.
Naudascher, Chas. F.,	1720 N. 12th St., Philadelphia,	Philadelphia.
Neilson, John,	Trooper,	Montgomery.
Nevin, John D.,	Easton,	Northampton.
Newbrough, W. H.,	Lansing, Mich.,	
Newcomer, Aaron,	Midvale,	Franklin.
Newcomer, W. S.,	Glenrock,	York.
Nissley, A. H.,	Bamford,	Lancaster.
Nissley, Walter B.,	State College,	Centre.
Noble, H. P.,	Waymart,	Wayne.
Norris, H. E.,	North East,	Erie.
Northrup, A. M.,	Ashley,	Luzerne.
Norton, W. C.,	Waymart,	Wayne.
Norton W. M.,	Waymart, Route 1,	Wayne.

O.

O'Neill, William C.,	2211 W. Tioga St., Philadelphia,	Philadelphia.
Oldach, I. F.,	North East,	Erie.
Oppenlander, Emanuel,	Passer,	Bucks.
Orton Bros.,	North East,	Erie.
Oyler, Geo.,	Gettysburg, Route 5,	Adams.

P.

Patterson, Jas. A.,	Stewartstown,	York.
Peachy, J. H.,	Belleville,	Mifflin.
Peirce, Ernest F.,	York,	York.
Pelton, J. L.,	North Girard,	Erie.
Pelton, W. C.,	State College,	Centre.
Pennel, Jos.,	Wawa,	Delaware.
Pennock, Edw. A.,	Chatham,	Chester.
Perham, W. E.,	Pleasant Mount,	Wayne.
Perry, J. J.,	State College,	Centre.
Pershing, Thed.,	127 Clividen Ave., Mt. Airy,	Philadelphia.
Peters, Earl,	Carlisle,	Cumberland.
Phillips, M. T.,	Pomeroy,	Chester.
Pierce, B. R.,	North East,	Erie.
Pierce, Geo. E.,	North East,	Erie.
Pitzer, H. C.,	Aspers,	Adams.
Pollock, Geo. B.,	Wyoming,	Luzerne.
Pomeroy, John H.,	Chambersburg,	Franklin.
Potter, Edwin P.,	Thompson,	Susquehanna.
Pratt, B. G.,	50 Church St., New York N. Y.,	
Prickett, J. W.,	Aspers,	Adams.
Purdy, H. P.,	Sunbury,	Northumberland.
Pyle, Robert,	West Grove,	Chester.

Q.

Quigley, J. E.,	466 S. Rebecca St., Pittsburg,	Allegheny.

R.

Raffensperger, Chas. E.,	Arendtsville,	Adams.
Raffensperger, Roy M.,	Arendtsville,	Adams.
Rakestraw, Thomas,	Kennett Square,	Chester.
Ramer, S. B.,	Camp Hill,	Cumberland.
Rawle, Francis,	West End Bank Bldg., Philadelphia,	Philadelphia.
Reed, Fred B.,	Chambersburg,	Franklin.
Reifsnyder, Geo.,	Phoenixville, Route 1,	Chester.
Reifsnyder, Jas.,	Phoenixville, Route 1,	Chester.
Reith, Geo., Jr.,	Wyoming, Route 1,	Luzerne.
Repp, Albert T.,	Glassboro, N. J.,	
Rettew, C. Vernon,	1000 N. 3rd. St., Harrisburg,	Dauphin.
Rice, Daniel,	New Bloomfield,	Perry.
Rice, Louis S.,	Scranton,	Lackawanna.

NAME.	POST OFFICE.	COUNTY.
Rice, Oscar C.,	Biglerville,	Adams.
Rice, Waybright,	Biglerville,	Adams.
Richards, A. C.,	Schellburg,	Bedford.
Riddlemoser, H. E.,	McKnightstown,	Adams.
Rife, J. L.,	Camp Hill,	Cumberland.
Rinehart, E. S.,	Mercersburg,	Franklin.
Rinehart, Geo. W.,	York, Route 4,	York.
Rittenhouse, Dr. J. S.,	Lorane,	Berks.
Robinson, Byron H.,	Meshoppen,	Wyoming.
Robinson, F. J.,	Honesdale, Route 3,	Wayne.
Rohland, Otto,	Narrowsburg, N. Y., Route 1,	
Root, A. W.,	Manheim,	Lancaster.
Root, J. W.,	Manheim,	Lancaster.
Ross, A. B.,	Schellburg,	Bedford.
Rouf, Frederick,	Hummelstown,	Dauphin.
Roynan, Richard,	Centre Square,	Montgomery.
Rozelle, H. E.,	Pittston,	Luzerne.
Ruhl, Harry F.,	Manheim,	Lancaster.
Runk, John A.,	Green Ridge, Md.,	
Rupp, D. C.,	Shiremanstown,	Cumberland.
Rush, John G.,	West Willow,	Lancaster.

S.

Sampson, H. O.,	Scranton,	Lackawanna.
Satterthwait, A. F.,	Middletown,	Dauphin.
Saylor, J. C.,	Pottstown,	Montgomery.
Schell, William A.,	West Chester,	Chester.
Schell, Walter S.,	1307 Market St., Harrisburg,	Dauphin.
Scholl, Calvin, P.,	Halifax,	Dauphin.
Schriver, H. E.,	Hummelstown,	Dauphin.
Schuchman, G. W.,	Carlisle,	Cumberland.
Searfoss, W. H.,	Wyoming, Route 1,	Luzerne.
Sedelmeyer, L. H.,	North East,	Erie.
Shallcross, Frank R.,	Frankford,	Philadelphia.
Shay, M. E.	Holmsburg,	Philadelphia.
Schaeffer, Henry C.,	Dillsburg, Route,	York.
Shoemaker, Seth W.,	Scranton,	Lackawanna.
Shoener, John,	New Ringgold,	Schuylkill.
Shorb, Albert,	Hanover,	York.
Shreve, Milton W.,	Masonic Temple Bldg., Erie,	Erie.
Seigfried, A. H.,	Selinsgrove,	Snyder.
Sierer, Dr. A. L.,	Mechanicsburg,	Cumberland.
Siegler, Franklin,	320 S. 44th St., Philadelphia,	Philadelphia.
Silvins, Geo. D.,	38 S. Wells St., Wilkes-Barre,	Luzerne.
Sloan, E. H.,	Orangeville,	Columbia.
Sloat, W. H.,	Camp Hill,	Cumberland.
Smedley, S. L.,	Bala,	Montgomery.
Smith, Arthur H.,	State College,	Centre.
Smith, C. M.,	Lewistown,	Mifflin.
Smith, Geo. W.,	Melrose, Conn.,	
Smith, Russel J.,	Swarthmore,	Delaware.
Smith, Morrell,	State College,	Centre.
Smith, W. O., M.D.,	15 S. Market Square, Harrisburg,	Dauphin.
Snavely, Hon. H. C.,	Cleona,	Lebanon.
Snavely, J. R.,	Harrisburg,	Dauphin.
Snyder, C. B.,	Ephrata, Route 1,	Lancaster.
Snyder, E. B.,	Jacks Mountain,	Adams.
Snyder, F. A.,	Pittston, Route 1,	Luzerne.
Stahle, C. E.,	Gettysburg,	Adams.
Stanton, Jas. F.,	New Stanton,	Westmoreland.
Starr, W. C.,	New Brighton,	Beaver.
Steele, Wilfred W.,	35 Hillside Ave., Franklin,	Venango.
Stein, Geo. E.,	East Prospect,	York.
Stephens, A. W.,	Mooresburg,	Montour.
Stevens, C. E.,	Duncannon,	Perry.
Stewart, J. P.,	Ithaca, N. Y.,	
Stewart, William,	Landisburg,	Perry.
Stigers, Jas. H.,	Hancock, Md.,	

NAME.	POST OFFICE.	COUNTY.
Stock, Karl F.,	Wyoming, Route 1,	Luzerne.
Stough, W. W.,	Shippensburg,	Cumberland.
Stouffer, Dr. C. B.,	Gettysburg,	Adams.
Stover, F. S.,	Bowmansville,	Lancaster.
Stow, W. L.,	North East,	Erie.
Strasbaugh, E. F.,	Orrtanna,	Adams.
Strode, A. D.,	West Chester,	Chester.
Strong, Robert J.,	Shiresmantown,	Cumberland.
Stull, James B.,	North East,	Erie.
Surface, H. A.,	Mechanicsburg,	Cumberland.
Swank, Luke H.,	Swank Bldg., Johnstown,	Cambria.
Swartwood, Morris,	Ransom, Route 1,	Lackawanna.

T.

Taunehill, Newton,	Canonsburg, Route 3,	Washington.
Taylor, A. M.,	Biglerville,	Adams.
Taylor, B. C.,	Chester,	Delaware.
Tennant, J. G.,	Westfield, N. Y.,	
Thomas, Carl B.,	Devon,	Chester.
Thomas, Chas. L.,	King of Prussia,	Montgomery.
Thomas, Jackson M.,	Emporium,	Cameron.
Thompson, John I., Jr.,	Lemont,	Centre.
Thompson, A. F.,	Lykens,	Dauphin.
Thorpe, Francis Newton,	Mt. Holly, N. J.,	
Throne, S. E.,	York, Route 3,	York.
Townsend, H. A.,	Light Street,	Columbia.
Treible, C. E.,	Vosburg,	Wyoming.
Trexler, T. A.,	Sunbury,	Northumberland.
Tritt, S. J.,	Huntsdale,	Cumberland.
Trostle, F. C.,	York Springs,	Adams.
Trout, H. E.,	Manheim,	Lancaster.
Tyson, A. R.,	Norristown,	Montgomery.

V.

Vandergrift, H. R.,	Cheltenham,	Montgomery.
Van Horn, Edw.,	Dorranceton,	Luzerne.
Van Tuyle, G. M.,	Pittston,	Luzerne.

W.

Wadhams, Miss Lydia P.,	275 S. Franklin St., Wilkes-Barre,	Luzerne.
Wagner, Geo. A.,	Landisburg,	Perry.
Wagner, Harry S.,	Carlisle,	Cumberland.
Wakelin, Amos,	632 Land Title Bldg., Philadelphia,	Philadelphia.
Wakelin, Miss Grace V.,	Ambler,	Montgomery.
Waldo, W. S.,	North Girard,	Erie.
Walter, William,	Blairsville,	Indiana.
Walton, Richard C.,	State College,	Centre.
Walton, Robert J.,	Hummelstown,	Dauphin.
Watterson, W. F.,	Cleveland, Ohio,	
Watts, E. L.,	Myerstown,	Lebanon.
Watts, R. L.,	State College,	Centre.
Way, Darlington,	Port Matilda,	Centre.
Weaver, Abram,	Windber,	Somerset.
Weidner, A. I.,	Arendtsville,	Adams.
Weigle, H. M.,	Harrisburg,	Dauphin.
Wells, W. D.,	North East,	Erie.
Weimer, E. A.,	Lebanon,	Lebanon.
Wertz, S. H.,	State College,	Centre.
Westrick, F. A.,	Patton, Route 2,	Cambria.
Whitlock, J. B.,	West Pittston,	Luzerne.
Wickersham, R. A.,	Mechanicsburg,	Cumberland.
Wiese, H. B.,	Parkesburg,	Chester.
Wills, F. A.,	1206 Montgomery Ave., Phila.,	Philadelphia.
Wilder, H. J.,	State College,	Centre.
Wiley, J. C.,	Bridgeton,	York.
Williams, J. L.,	Gettysburg,	Adams.

NAME.	POST OFFICE.	COUNTY.
Willson, H. M.,	Sharon,	Mercer.
Wilson, B. F.,	Aspers,	Adams.
Wilson, J. L.,	Overbrook,	Philadelphia.
Windle, Francis,	West Chester,	Chester.
Winings, A. H.,	Columbia,	Lancaster.
Winship, Lionel,	Moscow,	Lackawanna.
Withrow, J. C.,	Vanport,	Beaver.
Wolfe, Chas. A.,	Aspers,	Adams.
Wolf, Dr. W. E.,	Arendtsville,	Adams.
Woodbourne, D. Sterrett,	Shippensburg,	Cumberland.
Woodside, T. Frank,	1210 Chestnut St., Philadelphia,	Philadelphia.
Woodward, Albert L.,	3312 Haverford Ave., Phila.,	Philadelphia.
Worrell, Hibberd B.,	555 N. 17th St., Philadelphia,	Philadelphia.
Wright, A. Cooper,	Hummelstown,	Dauphin.
Wright, Robert C.,	Broad St. Station, Philadelphia,	Philadelphia.
Wright, W. J.,	State College,	Centre.

Y.

Yentzer, J. R.,	Conestoga,	Lancaster.
Young, Williard S.,	218 Briggs St., Harrisburg,	Dauphin.
Yoder, J. W.,	Ivyland,	Bucks.

Z.

Zigler, Amos,	Elizabethtown,	Lancaster.
Zimmerman, D. B.,	Somerset,	Somerset.
Zimmerly, H. H.,	State College,	Centre.

Membership by Counties

A careful study if this matter has proved so interesting to those who are most concerned in the growth of the Society, that it seems worth while to give it a little space again this year. These are the numbers up to April 1st 1911.

57 Adams.
44 Lancaster.
38 Erie.
35 Dauphin and York.
32 Chester.
30 Centre and Luzerne.
28 Philadelphia.
22 Montgomery.
20 Cumberland.
19 Wyoming.
15 Franklin.
13 Lackawanna.
12 Perry.
11 Allegheny.
10 Wayne.
9 Cambria and Washington.
8 Berks, Bucks and Lebanon.
6 Bedford, Columbia, Lycoming, Northumberland, Schuylkill and Westmoreland.
5 Delaware.
4 Mifflin and Somerset.
3 Armstrong, Beaver, Bradford, Butler, Cameron, Elk, Juniata, Lehigh, McKean and Susquehanna.
2 Blair, Clearfield, Lawrence, Mercer, Snyder, Venango and Warren.
1 Clinton, Crawford, Fayette, Greene, Indiana, Jefferson, Montour, Northampton, Potter, Sullivan, Tioga and Union.

It is significant of what the right of membership means to those who hold it, that the Counties highest in the list last year are, for most part, the ones which show the best gains this year.

We believe members will be interested in the following reprint from 1910 report.

The following list shows the number of Annual and 1910 Members in each county.

This matter of county membership is a perfectly proper field for competition and the officers are glad to encourage friendly rivalry in this direction.

Erie County heads the list this time, but already there are rumors that Adams County will be out for the lead next year. Erie is strong and spunky and the prospect is good for a lively contest. In the mean time it is perfectly possible that Wyoming or Lancaster or Centre, with State College to draw on, may beat both. The County that *leads next year* will have a *fine representation* in the State Association; mark my word!

64 Erie.
35 Adams.
25 Wyoming.
24 Centre.
23 Lancaster.
22 Dauphin.
15 Chester and Luzerne.
11 Philadelphia and York.
9 Franklin and Montgomery.
7 Wayne.
6 Cumberland.
5 Northumberland and Perry.
4 Allegheny, Berks, Lebanon and Lackawanna.
3 Beaver, Bedford, Butler, Cambria, Columbia and Somerset.
2 Blair, Bradford, Bucks, Indiana, Juniata, Lycoming, Mifflin, Northampton, Tioga, Union and Westmoreland.
1 Armstrong, Clarion, Clinton, Crawford, Delaware, Jefferson, Lehigh, Monroe, Snyder, Sullivan, Susquehanna Warren and Washington.

County Membership Trophy

A fine silver cup is offered to the County making the *most gain* in the coming year, as shown by the list to be printed in the 1912 Report, not necessarily the *largest membership* but the *most gain* over the 1911 list; the cup to be delivered to the County Association or to the County member of the Membership Committee where no County Association exists.

Roll of Honor

The following have qualified for the 1911 Roll of Honor, by securing five or more members, one life member counting as ten annuals. The Treasurer and Secretary are not eligible:

Miss M. A. Maffet,
T. C. Foster.
R. J. Walton.
E. B. Engle.
E. F. Peirce.
A. D. Strode.
E. P. Garrettson.
C. A. Wolfe.
A. O. Finn.
H. H. Snavely.
W. C. Tyson.
H. L. Anwyll.
J. R. Hepler.
J. Frank Gillespie.
C. E. Raffensperger.
J. L. Rife.
R. F. Lee.
A. R. Tyson.
J. C. Withrow.
W. C. Pelton.
S. L. Brinton.
C. P. Barnard.

CONSTITUTION.

ARTICLE 1.—*Name and Object.* The name of this organization shall be The State Horticultural Association of Pennsylvania. Its object shall be to foster and encourage the development of horticulture in the State of Pennsylvania.

ARTICLE 2.—*Membership.* Any person may become an Annual Member of this Association by paying one dollar ($1.00) to the Secretary, such membership to expire on the first day of the following annual meeting, unless renewed. Any one paying ten dollars ($10.00) to the Secretary at one time shall be entitled to Life Membership. Persons of distinguished merit in horticulture may be elected to Honorary Membership for the *current year,* by a majority vote of the members present at any regular meeting.

ARTICLE 3.—*Officers.* The officers shall consist of a President, three Vice-Presidents, a Secretary and a Treasurer, all of whom shall be elected by ballot at each annual meeting, to hold office for one year, or until their successors shall be chosen, except that the retiring Secretary shall edit the report of the annual meeting at which his successor is elected. These *elective* officers shall constitute an Executive Board in conjunction with an additional indeterminate number of Vice-Presidents whose names shall be announced by the Secretary at the annual election of officers. These Vice-Presidents shall be the regularly elected Presidents of any County Associations, organized in Pennsylvania for horticultural purposes, whose Constitution is approved by the Executive Board and whose income from annual membership dues during the preceding year was not less than ten dollars ($10.00). In order to secure admittance to this Board, the Secretary of such County Associaion shall certify to the Secretary of the State Association, that the applicant has been duly elected to serve as their President for the current year and shall also submit a statement showing number of members and amount of dues paid for the preceding year. All officers must be members of the Association in good standing at the time of their election and shall assume their duties at the close of the meeting at which they were elected.

ARTICLE 4.—*Quorum.* Twenty-five (25) members of the Association and five (5) members of the Executive Board shall constitute a quorum for the transaction of business.

ARTICLE 5.—*Standing Committees.* The following Standing Committees shall be appointed by the President to serve during his term of office: A Committee on Legislation, to consist of three (3) members; a Committee on Exhibitions to consist of five (5) members; a Committee on Membership to consist of one (1) member from each county in the State showing evidence of horticultural

activity, and a General Fruit Committee, consisting of one from each county represented, with a general chairman of the whole, each member of the Fruit Committee to have the privilege of appointing two assistants.

ARTICLE 6.—*Annual Meeting.* The Annual Meeting of this Association shall be held during the month of January in each year, at such time and place as the Executive Board shall determine.

ARTICLE 7.—*Amendments to the Constitution.* This Constitution may be amended by a two-thirds vote of the members present at any annual meeting, provided such amendment shall have been presented to the Secretary in writing at least sixty (60) days prior to time of holding the annual meeting, and by him referred to all members in connection with the announcement of said meeting.

BY-LAWS.

ARTICLE 1.—*Duties of the President.* The President shall be the executive officer of the Association and of the Executive Board, and shall preside at all meetings of either body, designating one of the Vice-Presidents to serve in his stead when necessarily absent. He shall pass upon all bills and accounts of the Association before they are ordered paid by the Secretary; he shall appoint all delegates to other Associations and all special and standing committees of the Association unless otherwise ordered.

ARTICLE 2.—*Duties of Vice-Presidents.* The Vice-Presidents shall serve on the Executive Board and any one of them may be called upon by the President or the Executive Board to assume the duties of the Chair at any meeting. They shall also actively represent the Association in its various lines of work in their respective counties.

ARTICLE 3.—*Duties of the Secretary.* The Secretary shall be the recording, corresponding and accounting officer of the Association and of the Executive Board; he shall incur no expenditure of a large or doubtful character without the sanction of the Business Committee; he shall secure the written approval of the President on all bills or claims against the Association before drawing his order on the Treasurer for the payment thereof; he shall attend all meetings of the Association and of the Executive Board and shall keep a faithful record of their proceedings; he shall sign all certificates of membership and all Diplomas and Certificates of Merit, awarded by the Association. All money received by him shall be promptly paid to the Treasurer. He shall have charge of the Association's books and papers and shall be responsible to the Board for all property placed in his charge; he shall be the custodian of the Seal of the Association, and shall have authority to affix same to documents when needful; he shall seek by all suitable means to secure the fullest announcement of the meetings of the

Association in this State, as well as in adjacent states, when such shall be found desirable. It shall also be his duty, yearly, to prepare for publication, the Annual Report of the Association, together with such other matter as he shall deem proper, he being aided in the selection of such matter by an advisory committee of the Executive Board. As recompense, the Secretary shall receive all necessary expenses, and such salary as may be determined by the Executive Board.

ARTICLE 4.—*Duties of the Treasurer.* All the funds of the Association shall be paid into the hands of the Treasurer; he shall disburse the moneys of the Association that shall come into his hands only upon order of the Secretary, countersigned by the President; he shall keep the moneys received by the Association for Life Memberships as a distinct fund, and shall invest the same under the advice and direction of the Executive Board, applying only the interest accruing thereon to the purpose of the general fund. Immediately upon assuming his office and before entering upon his duties, he shall execute to the Association an official bond with sufficient securities conditioned for the safe-keeping and disbursement of the moneys of the Association, and for the proper discharge of the further duties of his office, in such sum as shall be specified by the Executive Board, the premium on which shall be paid by the Association. This bond shall receive the approval of the President, and shall be deposited with the Secretary. Immediately preceding the annual meeting, he shall submit to the Executive Board a written report showing the amount of money that shall have come into his hands during the year, the sources from which it has been derived, and the disposition made of the same. This statement shall be published in the Annual Report of the Association.

ARTICLE 5.—*Duties of the Executive Board.* The Executive Board shall enact all rules and regulations for the management of the affairs of the Association, determine the salaries of its officers, and assume the control and management of its exhibitions; it shall have power to displace any officer of the Association for neglect of duty or abuse of position; shall fill all vacancies by appointment to continue until the next annual election; and shall hold at least two regular sessions during the year, one of which shall occur at the time and place of the annual meeting of the Association. It may hold other meetings when called by the Secretary under the advice or direction of the majority of the members of the Board at such times and places as may be deemed most convenient, but in all such cases, each member must be duly notified of the time, place, and object of such meeting; it shall carefully guard the interests of the Association, watch over its finances and provide for its necessities as they shall arise; it shall appoint from its own number three members, who shall constitute a Business Committee for the year, and upon which the Secretary and Treasurer may not serve; and it shall submit to the Annual Meeting, through the Secretary, such report upon the condition, general interests and prospects of the Associa-

tion as it shall judge necessary or expedient. All important measures shall be submitted to this Board, but may, by the Board, be re-submitted to the Association for recommendations.

Article 6.—*Duties of the Business Committee.* It shall be the duty of the Business Committee, upon application of the Secretary, during the recess of the Executive Board, to advise with him as to the expediency of making any contemplated but questionable expenditure for which occasion may arise during such recess. The Business Committee shall also audit the accounts of the Secretary and the Treasurer just prior to the annual meeting and submit written report of its findings to the Executive Board.

Article 7.—*Duties of the Standing Committees.* (1). The Committee on Legislation shall inform itself in regard to such existing laws as relate to the horticultural interests of the state and bring the same to the attention of the Association, at the same time reporting any additional legislation which in their judgment is desirable; when so directed by the Association, it shall cause to be introduced into the State Legislature such bills as may be deemed necessary and shall aid or oppose any bills introduced by others which directly or indirectly affect the interests of the fruit grower.

(2). The Committee on Exhibitions shall suggest from time to time such methods and improvements as may seem to them desirable in conducting the exhibitions of the Association, as well as other fruit exhibitions throughout the state, and with the assistance of the Executive Board, shall arrange the premium lists, and have charge of all exhibitions of the Association.

(3). The Committee on Membership and Expansion, with the co-operation of the County Vice-Presidents, shall bring the work of the Association to the attention of fruit growers throughout the state, and by such means as they deem best, strive to increase the membership.

(4). The General Fruit Committee shall carefully and thoroughly investigate the subject of fruit culture in general. Each local committee of three shall collect such useful and interesting information in relation to the subject as may be in their power, and embody the same in monthly reports, to be made to the general chairman; such reports to be by him examined and embodied in his annual and semi-annual reports.

Such other Standing Committees may be created by the Executive Board from time to time, as in its discretion may seem desirable or necessary.

All Standing Committees shall report to the Annual Meeting in January, any information of value to the Association or its members, that may have come to their knowledge during the year, as well as any scientific theories, deductions or facts that in their opinion may be useful in advancing the object for which the Association is laboring.

ARTICLE 8.—*Nomenclature.* The Association shall adopt the nomenclature of the American Pomological Society.

ARTICLE 9.—*Amendments to By-Laws.* Amendments or additions to these By-Laws may be made by a majority vote of the Executive Board at any meeting, but if objection shall be made, the same shall "lie upon the table" till the next regular meeting of the Board. These By-Laws, or any one or more of them, may be suspended for the time, by order of a majority of all the members of the Association present and voting. A proposition in the general meeting of the Association for an amendment or addition to these By-Laws shall be referred to the Executive Board for consideration and decision but the Association may submit therewith its advice or request.

THE COVER ILLUSTRATIONS

Engraved from Photographs.

FRONT COVER, YORK IMPERIAL,

Grown by Tyson Bros., Flora Dale, Pa.

BACK COVER, WINTER BANANA,

Grown by H. M. Keller, Gettysburg, No. 5, Pa.

PROCEEDINGS

OF THE

FIFTY-FIRST ANNUAL MEETING

OF THE

State Horticultural Association

of Pennsylvania,

HELD AT

Harrisburg, Pa., January 24, 25, 26, 1911.

The Fifty-second Annual Meeting of the State Horticultural Association of Pennsylvania convened in the Board of Trade Building, Harrisburg, at 1.30 o'clock, Tuesday afternoon, January 24, 1911, with the president, Mr. Gabriel Hiester, in the chair.

The meeting was called to order by the President, who immediately proceeded with the

PRESIDENT'S ADDRESS.

It is very pleasant to greet you again after a separation of a year, during which time we have all been working along practically the same line, thinking the same thoughts, fighting the same enemies, and, judging by the expression of the faces before me, reaping the same reward. Although we had some partial failures, owing to unfavorable weather conditions at critical periods, and some of us were badly scared for a few days during peach harvest, I think the year taken as a whole, has been a profitable one to the members of this association, and we have reason to congratulate ourselves on a bright prospect for the future.

The fruit exhibit in the other room tells the story of the possibilities of our soil and climate better than the words of any speaker, and those of us who have watched the exhibit from year to year can read a history of rapid advancement in the art and science of growing fruit. It shows advance in horticultural knowledge, improvement in business methods, and a general healthy growth in all directions. While it is right for us to feel a just pride in the progress we have made, it will not do for us to sit down and fold our hands, even for a day. If we were to take into account the great natural advantages of soil and climate in Pennsylvania for growing fruit, and the splendid markets that we have right at our doors, we must realize that we are not living up to our opportunities. Commercial orchards have been planted in a few localities, but there are yet

many thousand acres of ideal fruit land on the foot hills of our mountain ranges, that will produce fruit as fine as any on exhibition here to-day that are absolutely neglected and not paying a dollar of profit to their owners. One of the objects of this association is to bring to the young men of the state a knowledge of the possibilities of these rough lands, and we will not rest contented until every acre of fruit land on the foothills of these great mountain ranges shall be planted in fruit, representing one vast peach and apple orchard extending diagonally across the state from the Maryland line to the banks of the Delaware in Pike County, and the northern tier of counties shall be vieing with New York in the production of winter apples.

The question is often asked: "Don't you think there is danger of over production?" to which I reply not so long as we grow perfect fruit and pack honestly, and make a proper selection of varieties. For ten years I have been urging the importance of having an investigation made to ascertain the effect of different types of soil and subsoil on the various varieties of fruit, so that as new districts are opened up we may be able to plant only such varieties as will develop their best quality in that particular place. And my reason for so persistently referring to this subject is that the most costly mistakes I have made have been mistakes in the selection of varieties. After many unsuccessful attempts to interest the authorities higher up, at last through the influence of Dr. Hunt, Director of our Experiment Station, the Department at Washington consented to loan Mr. H. J. Wilder of the Bureau of Soils, to our station for one year. As most of you are aware he has been at work during the past summer and has secured much useful information from a number of widely different sections of our state, but not enough to make a connected or strictly accurate report. He has made an excellent start, and I think you are all beginning to appreciate the importance of this work, and will agree with me that we should not be satisfied with one year's service. I hope at the proper time you will pass a resolution asking a renewal of the loan.

If we are going to grow apples extensively it seems to me they should be sold from Pennsylvania and go to the markets of the world as Pennsylvania fruit.

The western New York apple men are enthusiastic over a scheme to make Rochester the greatest apple market of the East. The plan contemplates the holding of a two weeks' apple show and sale in Rochester to draw buyers from all parts of the country. The first apple show and market will be held the last week of November and first week of December, 1911.

I believe we ought to begin to lay plans for a similar show and sale in Harrisburg. You may think I am a little premature in this matter, but I find it is well to have a definite plan to work on—a plan that will provide for conditions that are bound to arise in the future. In less than five years we will be in position to hold right here in Harrisburg as fine an apple show and market with as many barrels and boxes offered, as they can hold in Rochester next fall. I would suggest that our Executive Committee carefully note the progress

of New York along this line, as well as the marketing methods of the far western states and the peach growers of the South, so that we may be prepared to formulate a plan suited to our own conditions when our young orchards come into profitable bearing.

The importance of working together is being more forcibly illustrated each year. We have found it of advantage in our township and county associations. We have found it of advantage in our State Association. On the 21st of December The Eastern Fruit Growers' Association was formed, which is designed to take in all the state and county associations of the Eastern coast states. Our association is invited to join. I will ask our Secretary to bring the matter up for action at the proper time.

Adams County York Imperials.
See paper of Prof. R. L. Watts.

In the matter of securing uniform legislation as to size of fruit packages and the grading of fruit we are invited to co-operate with New York, New Jersey, Michigan, Ohio and Virginia; this is a subject which concerns us all and I will ask the Secretary to make it an item of new business at one of our sessions.

We should keep in closer touch with the State Department of Agriculture and our State Experiment Station, they are all operated for our benefit and if we do not get as much from them as we think we are entitled to it is largely our own fault.

We find some very interesting results showing up in the orchard experiments of Professor Stewart; one especially attracted my attention. I referred to it in my report as Pomologist of the State Board of Agriculture, and consider it of sufficient importance to mention it here. Professor Stewart reports that nitrogen applied

in the form of nitrate of soda to bearing apple trees in June after the fruit has formed, will increase the size of the fruit as well as the growth of the tree, but this increase in size is attended by loss of color in red apples; this loss of color Professor Stewart attributes to delayed ripening, and his opinion is that in those sections having a longer season—notably southern Pennsylvania—the fruit will regain most of its color. We all know if we spray our apple trees with a fungicide under proper weather conditions the foliage may be kept green and healthy until killed by frost, and when such is the case the fruit hangs on the tree much longer. This may mean a great deal to the orchardists in the York Imperial belt. If by the judicious use of nitrogen as a fertilizer and a proper fungicide as a summer spray we can hold our Baldwin, Spy, King and Smokehouse on the tree until the middle of October, by which time the sun will certainly have painted them the proper color, we can double the profits on these varieties—and will be encouraged to plant more of them than we are now doing.

Since our association was first formed conditions have changed very materially, so much so that we find our present Constitution does not meet the requirements of the times. During the interval between sessions, I have appointed a committee to take up this subject and in consultation with the Executive Committee suggest such changes as in their judgment are necessary. These amendments will be presented for your approval at this meeting. In conclusion I will quote a new year sentiment given by Governor Stewart because it is much better expressed than anything I can formulate: "Let us commence the new year by resolving to do something worth while, something that will be of benefit to some one besides ourselves, and let us make sure that at the end of 1911 we shall be able to say that we have been of real service to our fellow men, our city, our state, our nation. Let us eliminate as much of the selfishness in us as possible, so that when the next New Year comes around it may be truthfully said of us, that we have remembered that there are others."

REPORT OF THE GENERAL FRUIT COMMITTEE.

By Mr. J. D. Herr, *Chairman, Lancaster, Pa.*

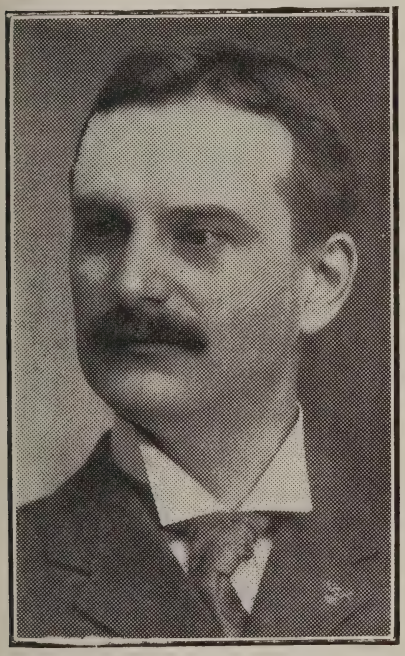
In offering this report I wish to state that the data herein contained are compiled from one hundred local reports received from members of our committee located in nearly every county in the State, in reply to a list of questions sent out about December 1st. I desire to express my appreciation of the assistance given me by the members of the committee, and my thanks are hereby extended to all who have so kindly and carefully answered the numerous questions submitted.

The yield of apples for the year 1910 appears to average 40% of a full crop. This average is kept low because of the reports of failure of the crop in the western half of the State, caused by a killing frost which visited that section about May 1st, after an un-

usually early spring had forced the trees into bloom. It is worthy of note that only orchards located on sites with faulty air drainage were affected, while others in the same locality, but situated more favorably, escaped uninjured.

The quality of the fruit is reported as good and very good by over 50% of my correspondents. Twenty-five per cent report poor, while the remainder is divided between medium, fair and "good where sprayed." Prices vary as may be expected, about as widely as quality, and range from 50 cents per bushel and $1.25 per barrel to $3.00 and $4.00 per barrel. The prices in the commercial sections seems to have been $2.50 to $2.75 per barrel net at the time of picking, while such growers as have stored their crops are now receiving a considerable advance on these prices.

Eighty per cent. reply in the affirmative to the question, "Is the crop profitable in your county?" and only 6% in the negative, and these explain in the next answer that the failure to make the crop pay is due to lack of care, neglect, and indifference on the part of the owner. We have here an eloquent commentary on the possibilities of fruit growing in this State. Commercial planting is reported on the increase from sixty counties, the varieties most planted being Stayman Winesap, York Imperial, Jonathan, Rome Beauty, Grimes Golden, Summer Rambo and Smokehouse, in order named for the southeastern section of the State, while the Baldwin, Spy, Greening, Wealthy, Duchess, Stayman Winesap, McIntosh and York Imperial appear to be the favorite varieties for the remainder of the State.



In sharp contrast to the report of a year ago the yield of pears has been good, with few exceptions, all over the State. The few counties reporting poor yields or failures are included in the section visited by late frosts, and such failure is attributed to this cause. The price and quality was good, except in some cases for Kieffers. Only 15% of replies report commercial pear growing on the increase. Pear blight is without doubt the leading pest of this class of fruit trees, and may be a factor in preventing commercial planting. San Jose scale, codling moth, borers, and leaf blight, are other destructive pests mentioned.

The peach crop of 1910 was without doubt one of the heaviest ever grown in this State, many counties reporting 100% of a full yield. There was a combination of favorable conditions in nearly all sections where peach trees thrive in this State for the production of a full crop of fine fruit, the quality being reported good from all such sections, while the prices received were somewhat lower this season than the preceeding, ranging from 50 cents to $1.25 per basket, and averaging 80 cents. The crop is said to have been profitable in all sections of the State, except the northern tier of counties in addition to Cameron, Elk and Forest.

The most destructive pests of the peach are said to be yellows, San Jose scale, borers, monilia rot, curculio; while under this head are mentioned winter killing, vagabonds and neglect. No better evidence is needed to prove that the Pennsylvania peach grower knows the best methods of combating the pests common to this fruit than the uniformity with which these answers agree upon their treatment. Cutting out of trees infected with yellows, removing the borers, and spraying infested trees with Lime-sulphur Solution for scale insects, and as a protection against rot, is universally reported as giving the best results. The control of brown rot is, as yet, a problem only partially solved, since 60% report that this disease is not being controlled, a number having failed in their efforts to save their fruit, even by the use of the Lime-sulphur Washes. There is no doubt that most thorough going treatment must be applied to eradicate monilia rot from the orchard when it has once gotten a foothold, and pruning, gathering and destroying mummied fruits, as well as thinning, are giving best results in connection with the use of Lime-sulphur Sprays. All sections, except those already mentioned as not well adapted to the growing of peaches, report an increase in the planting of commercial peach orchards.

The yield of plums is given as fair to good over the State generally, with quality medium to very good, and the price averaged $1.60 per basket. A few growers quote 20 cents to 30 cents per 8-pound basket, and this would seem to be a very good package in which to handle plums. The conditions governing the production of this crop were usually good, although a number of growers report late killing frosts as having curtailed the yield. Commercial planting of plums is not on the increase, except in half a dozen counties, and the varieties mostly grown are the German Prune, Lombard, Bradshaw, York State Prune, while a few prefer the Japanese varieties, as the Burbank, Abundance, and Satsuma. The curculio is without doubt the most serious pest affecting plums. This, with brown rot, black knot, San Jose scale, together with limited markets in most sections for the fruit, no doubt has tended to deter extensive planting.

Sixty per cent, of my correspondents state that cherries are not grown largely in their respective sections, although where they are grown they are nearly always profitable. As to the best varieties for shipping, Montmorency receives the largest number of votes, with the Early Richmond a close second. Following in order

are Dyehouse, Napoleon Biggareau, Black Tartarian, May Duke and Reine Hortense.

There is but one section of the State in which grape growing is carried on extensively, viz: the extreme northwestern, and here the crop has been fair to good. In the remainder of the State grapes are usually grown for home use, and to supply the local markets to a certain extent. The worst pests of the grape are black rot, mildew, grapeberry moth, rose bugs, and root worms. Concord, Niagara, Worden, Brighton, and Moore's Early are the principal varieties.

The favorite varieties of strawberries seem to be Haverland, Bubach, Dunlap, Sample, Glen Mary, Brandywine and William Belt. Of raspberries, the Gregg is the most popular, followed in order with Cumberland, Cuthbert and Kansas, as the best paying varieties of raspberries, and Snyder, Eldorado, Erie, Kittatinny, Merserau, are voted the hardiest and best blackberries. The only other small fruits grown with profit reported are currants, gooseberries and dewberries.

Field of Rhubarb on the Farm of Matthew Heist.
See Address of Prof. R. L. Watts.

The past season has, as a rule, been favorable to the growth of vegetables, and tomatoes, potatoes, beans, peas, cabbage, corn, asparagus, and onions, are crops which have paid best. The crop is generally profitable, and potato bugs, cabbage worms, root maggots, aspargus beetles, and rust are the most destructive enemies. All but 6% of the replies contain the statement that the San Jose scale is now being held in check. The spray giving best results is Lime-sulphur solution, this being given in all but five replies, which name Scalecide in connection with Lime-sulphur. Twelve state that the oil sprays are unsatisfactory, and eight that these materials are in-

jurious to the trees, dentalizing them, closing the pores, cracking the bark, killing the bark and killing the tree.

Spraying for codling moth is becoming common throughout the State, and over three-fourths of the replies indicate that this pest is being successfully controlled by the use of arsenate of lead, Paris green and Pyrox. Only two failures to control codling moth with arsenical sprays are reported.

In spraying for the control of fungous diseases of the orchard a remarkable change has taken place in the selection of the fungicide. Bordeaux mixture, for many years the standard, must now yield to Lime-sulphur, the palm of popularity, since there are a slightly larger number of growers reporting good results from its use than from Bordeaux. The degree of dilution on apple and pear averages 1-30, while on peach it is reported as being used much weaker.

Collar rot is reported from fifteen sections of the State, and twig blight on apple, pear and quince from fifty. The only treatment reported successful is cutting out of diseased portions, spraying with a fungicide, and applying equal parts of lime and sulphur about the diseased collar of the tree.

Borers on apple, pear, peach and plum trees constitute a most serious menace to the industry of fruit growing, and 65% of the reports contain the statement that this pest is doing much damage in their respective sections. There is no perfect preventive of borers yet found, although a number of growers report fair success from the application on the trunk of whale oil soap solution, Lime-sulphur solution, liquid manure, white lead and raw linseed oil, unleeched woodashes and wrappers. All recognize the necessity of cutting out borers when they have once entered the tree.

Mice and rabbits are doing considerable damage in many sections of the State, and it is evident that the proper steps are taken to prevent injury by these pests. Persons annoyed by them are cleaning up the rubbish in the orchards, killing the rabbits and applying to the trunk of trees in orchard where damage is anticipated, veneer, wire screens, white lead and raw oil, blood and salty lard. I have personally found one orchard which was abundantly infested with these pests absolutely protected for five years from these pests by one application of axle grease to the lower twelve inches of the trunk.

The use of fertilizers in the orchard is on the increase, and one-half of the reports state that the practice is followed in their community. The best results attend the application of stable manure or a complete fertilizer to the amount of 400 pounds, mixed after the formula of 2—8—10. The use of lime is well understood, and it is no longer applied generally as supplying any of the elements of fertility, but an occasional treatment for the purpose of sweetening the soil and setting free the elements of fertility by its chemical action upon vegetable and mineral matter.

On the subject of tillage most growers agree that young orchards should be cultivated either with or without an intercrop, a few answering that this is absolutely essential in the case of peach

orchards. Many are practicing clean cultivation up to July, when cover crops are sown, and crimson clover is the favorite among these. Rye, mammoth clover, vetch, buckwheat and oats are other crops grown for this purpose.

Thirty per cent. of replies state that mulching is practiced in orchards of their section, especially in orchards planted on hillsides with good and very good results.

A slight majority of correspondents advise against the practice of heavy pruning of apple and peach. A number qualify their replies by limiting this work to young trees only, and others take the medium ground that pruning should be done only when necessary.

There is a remarkable unanimity of opinion on the subject of thinning trees, all but two replying that this work can be done profitably.

The necessity of keeping bees in the orchard is still a mooted question, although the majority agree that bees play an important part in the pollenation of the blossoms.

In order to learn the general sentiment prevailing throughout the State, the question was asked, "What has been the effects of experimental and demonstration work as conducted by State College and the Department of Agrilculture?" and the replies received are "Good," from twenty-five reports; "Awakened general interest in fruit growing," by ten; "Admirable," by five; "Very good," by six; Very excellent," by five; "Many have profited," by three; and other answers are "Wonderful and surprising," "Remarkable," "Aroused wonderful interest," "Made fruit growers sit up and take notice," etc., while one replies that "It has made a corpse walk and jump."

One correspondent objects to what has been and is being done in this direction, by saying that it is not the proper work of any State, or National Department, to do propaganda work in any particular industry. The reply to this objection is obvious, and that is that so long as the fruit trees of the State are threatened with extermination because of the failure to apply well known scientific treatment, or the State has thousands of acres of lands highly adapted to fruit growing, some Department of the State Government can well devote a small part of its revenue to disseminate this knowledge without laying itself open to the charge of paternalism. The fact that the Western states are shipping fine fruits into Pennsylvania, which have taken the place in all good markets of home grown fruits, should arouse a feeling of pride in our own natural advantages and abilities, and this I believe is being done.

Vice-President Eldon in the chair.

The Chairman.—You have heard the report of the General Fruit Committee. What is to be done with it?

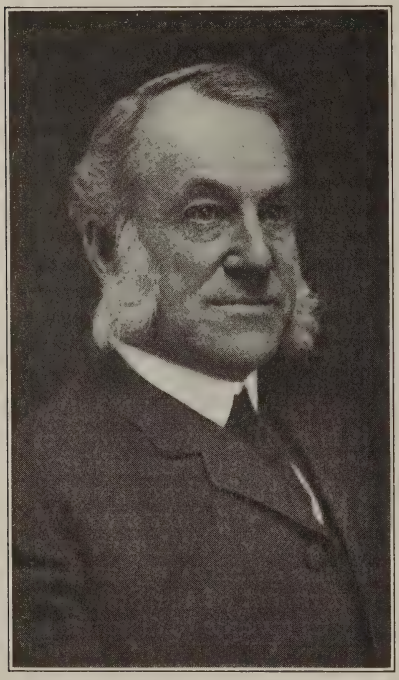
A Member.—I move it be accepted and entered on the Journal of the Association.

This motion was seconded, and carried.

THE VALUE OF THE PROPAGATION OF FRUIT TREES FROM SPECIAL SELECTIONS WITH REFERENCE TO CONSTITUTIONAL VIGOR AND PRODUCTIVENESS.

By George T. Powell, *New York City.*

Mr. President, Ladies and Gentlemen: It certainly gives me great pleasure to again stand before a Pennsylvania audience. It was my privilege between 1897 and 1904 to meet with many audiences in your state, called for the discussion of agriculture. I have attended some years every Farmers' Institute in your State, and have frequently spoken before your State Board of Agriculture. I remember on one occasion in speaking before the State Board of Agriculture on "Good Roads." When I finished, a member of the Board, who was a very intelligent old German farmer, got up and said he was much interested in what the gentleman from New York said on "Good Roads," but, he said, "I don't think much of what he said about brakes on wagons, because I think he is a ——— poor horse that cannot keep out of the way of a wagon in going down hill."



This afternoon I am to speak to you on the subject of Orcharding and the Propagation of Trees. I do not know of a more important subject. We have been planting millions of fruit trees in the past few years, particularly of apple trees, and we are still planting apple and other fruit trees by the millions, and yet, never in the history of apple culture, have apples been so high as at the present time. We have seen a wonderful increase in the planting of fruit trees, and yet fruit is practically out of the reach of hundreds of thousands of our people who should have it. In 1896 the apple crop of the United States was something like 68,000,000 barrels, and we have never produced anything like it since. Our general yearly production runs from 23,000,000 to 45,000,000 barrels. Now, why is this so with all the extensive tree planting;

why is there not an increased yield all over the United States? I believe one reason is that we have not given as much thought to the propagation of our trees as we should.

I can take you through orchards in New York State, and show you numbers of trees there that produce very little, and some years nothing at all. They simply cumber the ground, and thus the propagation of fruit trees becomes one of the most important subjects before our growers to-day.

Now, why should there such a different in the production of trees? Simply because there is in all plant life the same variation in productivity that we find in animal life. Every farmer here this afternoon, who may be a live stock breeder, will understand that. In his breeding of animals he discovers much variation. It is very seldom that you can breed from the same stock a number of colts that, when grown,, will be of the same type. It is seldom that you can breed along the dairy line, two heifers from the same stock that will give an equal yield in milk and butter. It is this law of variation that makes it so difficult to produce in animals anything like uniformity, and in fruit trees this same law of variation is at work, hence we do not get uniform results in our orchards.

Now, my suggestion is this: I believe it is possible for us to get more uniform results in our orchard practice, if we study the stock from which we take our scions. In nursery practice, seedling stocks are used, and then we take the buds from the young trees in the nursery and put them on these seedling stocks. What is the result? We are grafting on our trees scions that have simply a vegetative tendency. It takes the Northern Spy, in New York State from fifteen to twenty years to come into bearing. I can show you trees that have borne no fruit in twenty years, and I firmly believe that by exercising the principle of selection, we can produce a high quality of fruit in a much shorter time. We need to take our scions from the more mature trees. There are choice varieties of Spitzenberg, Jonathan, Grimes Golden—all very fine apples. Why don't we have more of them? Because they are not strong trees or vigorous bearers. The King of Tompkins County is another choice variety, but it does not produce well. It is not of vigorous stock, is subject to canker, and the tree will pass out very readily. In fifteen years you will have a very broken orchard of this variety. Now, I believe it is possible to grow the King and the Spitzenberg profitably. I think I have proved this fact.

It is something more than twenty years ago that I began to advocate taking our scions from the strong, vigorous, more mature trees. I advocated it at a Nurserymen's Convention, but not a member of that Association accepted my theory. They said they did not believe there was anything in it; that a bud was a bud, and would produce a tree. Now, that does not apply in stock breeding. We know of instances where men have paid a hundred thousand dollars for a stallion. Why? Because he was recognized as a most valuable animal, and his prepotency was known. Now, this same principle will apply in plant life, and starting on this plan, I began to work it out. I choose as my first experiment, the King,

because of its high value. I selected first the buds from an ideal King tree and top-worked Northern Spy trees; you know that tree is known and noted for its vigor. It has a good, strong root system, and when you can get roots that will go down deep into the soil and take strong hold there, you will have good and vigorous trees. It is twenty-one years ago since I started this experiment on my father's farm. He had planted the King trees, not one of which is now left, but in this orchard in which I experimented, we have trees that have been top-worked for twenty-one years; which show no evidence of canker, and are producing from seven to nine barrels of apples to the tree. Now, this is a wonderful record for the King; it is a fine fruit, but not a heavy yielder, and yet these trees show every evidence of going right on and being profitable for a half or three-quarters of a century more. Now, that is what I mean by our propagating stock with greater care. I might mention one or two others—the Talman Sweet (the wood is like steel), the Northern Spy, the Northwestern Greening—are the same, so fine grained is the wood, and so hard; you can use these safely to work the other varieties on them. I believe in this way we can increase the yield of apples in the United States at least fifty per cent. in the next twenty-five years, and produce fruit more abundantly that consumers ought to be able to have.

One other point. For a number of years, I produced among my trees large quanties of currants, but they were not satisfactory, and I began to investigate why the yield of this fruit should be so small, and I found that many of the largest appearing plants were not producing anything at all.

As the pickers came in one day, I discovered that a large number of trays came in with very little fruit from their rows, and then, again, other pickers came in with baskets filled in a very short time, heaped up with beautiful fruit, while it took the pickers in the thin rows a long time. I began to investigate, and found that in these thin rows bush after bush had no fruit upon them. They were large bushes, but had nothing whatever upon them. Many of the bushes were of this type—strong bushes, strong stem with perhaps only a single currant upon them, while side by side with them, were the bushes of this type—the bushes loaded from top to bottom.

These weak bushes were at once taken out and burned up, in order that we might not propagate from them longer, but propagate only from the strong bushes. Thus we began propagating our bushes from strong producting plants. As the result of this selection, we have increased our yield from an average of only one quart from a type of bush like this to an average of sixteen quarts from a bush of this type. This is a principle of sixteen to one that beats William Jennings Bryan's financial theory of 16 to 1 in silver and gold.

By studying the productivity of the plant you can propagate from the most productive plants, and increase your yield from fifty to five hundred per cent.

Now, when we begin to study the tree from this standpoint, there is not a grower who cannot, in a few years, build up an orchard that will be infinitely more profitable than it is to-day.

Gentlemen, one of the most important things to do in setting out a young orchard, is to study the trees in your neighborhood, or somewhere else until you find those that have a given record of thirty, forty or fifty years, and take your stock from them and put it on the Northern Spy, or the Greening, or the Talman Sweet, and you can increase your orchard yield very perceptably.

Now, there is another very important matter, and that is the question of properly controlling the influences that interfere with the vitality of the tree. That is the question of diseases and insects. You can take the best bred tree, and reduce its ability to produce by repeated injury through the different types of insects. We have in our country gradually increasing numbers of insects, and they are producing a most deleterious effect upon our trees. Insects that are allowed year after year to denude the trees of their foliage, will in time so reduce their vitality and ruin their constitution, that we lose these important qualities in trees. My idea of spraying is that it is not only to destroy insects, but to increase the productivity of the tree; not only to maintain high quality of fruit, but to keep up the productivity of the tree. When you protect the tree from injury you preserve the source of future increase. Given a tree with strong vitality, strong constitutional vigor, and you can transmit to other trees, the properties that influence their production.

Another point raised on this subject was: At that convention the nurserymen said to me, we can't afford to grow trees on your plan; it costs too much. If we take the buds from mature trees they will fail to grow. That is true; buds from mature trees do not grow so well. "But," I said, "I would rather pay you a dollar for a tree grown after this fashion than take your trees grown from the nursery buds at fifteen cents apiece, because I can gain time by it." This point is disputed by some scientific men; they say it is a question whether you can get fruit quicker by bud selection. I have on my farm to-day some ten thousand trees many bearing fruit, and most of which were propagated along this line. I have produced Rhode Island Greenings from trees that have been top-worked with selected scions and which have produced half a bushel of apples to the tree at three years. Now, you all know that the Rhode Island Greening is not an early bearer. It is usually seven or eight years, sometimes longer, before it begins to produce, yet in three years from the time my trees have been top-worked, I can get from half a bushel to a bushel of apples to a tree.

During this season I have been able to make a record with the Wealthy apple. It is naturally an early bearer, and yet on my farm six years after the trees were planted and top-worked, we were able to show a profit of sixty dollars an acre. That is an unusual record. Let me say, in this connection, that in top-working it is of the utmost importance that the trees be kept in a growing condition especially where budding is done.

You cannot hope to meet with much success with what is known as the mulch system. You have to have thrifty, growing trees, otherwise the whole system will fail. You will understand

that I am an advocate of culture in the orchard, not of the mulch system. Now, this Wealthy orchard has been thoroughly cultivated from the time the trees were set out. During the year 1909 there was a very good setting of fruit, but the most of the fruit was taken off. Last year it came out with a magnificent bloom, and a fine setting of fruit. Then we went over the trees and had at least one-half of the fruit taken off. That was when the fruit was about one-quarter grown—about July 1st. Men and women were set to work again two weeks later, with instructions to take off anything between six or eight inches, no matter how perfect the fruit was. The result was that the fruit was very fine, and sold for $4.50 a bushel, so that after deducting all expenses for freight, barrels, commission, etc., when the balance was struck that young orchard showed the profit of which I have spoken.

Six-Year-Old McIntosh Trees.
From special selection when propagated, some trees of which bore one barrel of apples each the first season—Orchard of George T. Powell.

Now, I believe that great value lies in propagating from perfect trees. You don't want one tree full, and the next half full, and on the next perhaps none at all. Through this method of propagation you may have every tree in your orchard giving you a satisfactory yield. There is no other way possible in which you can get uniformity in orchards, and a greater uniformity in bearing, except through his principle of selection of which I have spoken and advocate.

I believe it is possible to extend this principle to the propagation of peach trees. Why is it, that when we have frosty periods in the spring, that a portion of the crop—perhaps one-half—in the same localities, is not affected by the frost, and suffers no harm?

How can you explain the fact that in the same orchards some trees will come out unharmed? Here comes in this same principle of variation, and it applies not only to the productivity of the trees, but also to hardiness and resistance in trees. I believe it is possible to so develop trees that they will not only show greater productivity, but will have greater resistance to frost, and will come out unscathed. Such trees are to be discovered and to propagate from them, in time will enable us to produce trees that will be practically frost-resisting. Also we should study and propagate trees for resistance to disease. I sent a man over Central New York to find a King tree that had been bearing for thirty years, and had in that time shown no sign of disease, and when he found it, had him send me buds from that tree from which to top work my Northern Spy trees. By working in this manner I believe it is possible to produce a tree that is also practically disease resistant as not a trace of disease has yet appeared in this King orchard.

Now, I think I have made this point clear to you. Before I close, I want to give you an opportunity to ask me any questions which you care to.

Prof. Surface.—What age do you propagate the tree, and how do you do it?

Mr. Powell.—I set the tree, and top-work it the same season. If I set it in the spring, I bud it in the fall. I have changed my opinion somewhat in that respect. I used to take two-year-old trees, and top-work the following year.

Prof. Surface.—From what growth do you want the bud?

Mr. Powell.—I want a perfectly sound tree. For instance, apple trees usually make their growth from the middle of June to the middle of August, then I go through the orchard and select buds from the trees that show the best growth in that time. Choosing the buds that are strongest and best developed.

A Member.—You say the Northern Spy transmits vitality to the root it is grafted on?

Mr. Powell.—Yes. The Spy has a marked influence upon the roots of the stock upon which it is budded.

A Member.—Would it do it as well on its own root—as well as if it was grafted on?

Mr. Powell.—I think it might not affect its own roots the same. I was invited to meet the growers of the Ozark section of Missouri. In the discussion of this question there, one of the oldest growers and nurseryman, Colonel Evans, rose in the audience and said he thought he was the only man who knew anything about that, and then he related how he had arrived at his conclusion which was the

same as mine. He said that in that region when he came to plow out their blocks of rejected nursery trees, one mule could take out any variety except the Northern Spy; for that he had to take two mules, and he discovered that when stocks were budded with the spy buds, the roots became stronger, and it took two mules to plow them out. He then budded light growing varieties on the Spy stocks.

A Member.—Have you noticed any difference in the time of ripening in budding the different varieties on the same tree?

Picking Adams County York Imperial.
See Paper of Prof. R. L. Watts.

Mr. Powell.—No, I cannot say that I have. except possibly in the case where a very early variety was top-worked. My father had some Early Harvest trees, and I grafted them over with the Twenty Ounce apple, and I have been able to ship the Twenty Ounce apples a month earlier. I ship them to England, and by the one month's earlier shipment I have been able to realize quite higher prices.

Prof. Surface.—What early variety is strong enough to top-work?

Mr. Powell.—If I were going to use an early stock I would choose perhaps the Wealthy, upon which to work an early varieay.

Mr. Wickersham.—I was thinking that it is not, perhaps, so strong a grower.

Mr. Engle.—How about the Red Astrachan?

Mr. Powell.—Yes, it is a good grower of the Russian type.

A Member.—For, say, the McIntosh Red, what would you prefer as stock to work on?

Mr. Powell.—The Spy, or the Talman Sweet, or the Northwestern Greening. I would buy the best one-year trees to be had, and instead of planting in the orchard, I would plant in nursery rows because you can cultivate cheaper in this way. Then I would bud them the same season, and I would put the buds close to the ground. This gives the advantage of double working. You get this influence of the double working not only on the root, but on the top. I believe in a low-headed tree—I would not have the head more than two and a half or three feet from the ground. For the Rhode Island Greening I would put the head at about four feet.

A Member.—Why not allow the nurseries to do this work?

Mr. Powell.—That is a very practical question. In the first place, it is the business of nurseries to grow trees, and they will take better care of them than any farmer will. Now, if the nurserymen will do this, select the buds from fine mature trees, that would be the best thing to do. We will gladly pay them the extra price for the trouble. For the farmer or fruit grower to go into an orchard of five hundred or a thousand trees, and do this extra work requires considerable time. The work can be better done in the nursery. I believe that there is no better class of men than nurserymen, no more conscientious men who desire to grow good stock and trees true to name. There are mistakes made in regard to varieties.

A Member.—How about the agent?

Mr. Powell.—Well, beware of the man who goes round, showing the most beautiful pictures of trees, and has in his pockets labels of various kinds so that he can give you any variety that you want—at least so far as the label goes. Better buy direct from well-known responsible nurserymen.

A Member.—I believe that some of the orchardists do not care to furnish the buds.

Mr. Powell.—Well, I have no sympathy with that kind of a man. The wider a good thing can be disseminated the better for all.

Dr. Mayer.—Would you not prefer root grafts, on the same principle that Kerr propagates the American plum on peach roots?

Mr. Powell.—I think it would be advisable if it can be done and the same results obtained. I have not used root-grafts. I prefer the whole root tree in its propagation.

A Member.—Will the budding of one variety upon another change its flavor, and to what extent?

Mr. Powell.—No, I think not. I think you cannot discover any change in flavor, grafted on the different varieties.

A Member.—How about color?

Mr. Powell.—No, I think that is not affected, either. That comes from the sun.

A Member.—If the soil, elevation and variety is the same, do you think there is a difference in the trees' resistance?

Mr. Powell.—Yes, I think there is. Individuality which is the result of the law of variation will be found under all conditions and we need to study, to observe and then to select.

A Member.—Will the matter of a change in a degree of latitude make any change in the propagation of the tree?

Mr. Powell.—No, I think not. I think those planted in the North will do very well for you here in Pennsylvania, and I would just as soon have trees grown in Pennsylvania, as those in my own state.

A Member.—What do you consider characteristic about the King?

Mr. Powell.—Its wood. When I prune my King trees it is simply play. On examination of the King tree, you will find that it is a soft wood, and hence, is not so resistant to disease; but when I prune the Spy, it is a very hard wood. It is like cutting through bars of steel.

A Member.—Does this propagation have any effect on the quality of the wood?

Mr. Powell.—Yes, I think it has, as the Spy affects the root, it may also influence the top and make the wood firmer, and harder, and more resistant to disease.

A Member.—One question: Does it matter where you put the bud?

Mr. Powell.—So long as you have the influence of the stock I think you have the benefit just the same if budded close down, or higher up on the body.

The Chairman.—We will now take up the next number on the program, which is "Blights and Cedar Rust on Apple," by Prof. H. R. Fulton, of State College. Two subjects have been assigned Mr. Fulton. He will read both papers, after which both will be open for discussion.

APPLE RUST.

By Prof. H. R. Fulton, *State College, Pa.*

The fact that certain of the rust fungi attack two entirely different host plants during their complete life cycle, is strange enough to challenge perhaps immediate belief. One of the most notorious examples of this is the stem-rust of small grains, which has a second stage on the leaves of the European barberry, a rather uncommon plant with us. In New England, where it early became established, growers of wheat noted what was also noted in the Old World, that grain rusted most when growing near barberry bushes; and so the practical patriots of Massachusetts, some years before the colonies became a nation, passed a law requiring the destruction of barberry as a protection for their grain crops against rust. Unfortunately, this rust has the ability to bridge over from one grain crop to the next without the aid of barberry, largely through infection of the fall-sown grains and certain wild grasses. Actual proof of the relation of the stem rust to grain crops on the one hand and to barberry on the other was first made by a German botanist in 1864.

Two years later a Danish botanist followed up the clue furnished by horticulturists' traditions, that apple and other pomaceous plants contract orange rust from cedars; and proved experimentally that certain European species of rust do pass from cedars to apple and related plants, and vice versa.

For certain American forms of cedar rusts, Drs. Farlow, Thaxter and others have established the relationships to pomaceous plants, and we now know with the certainity that comes from rigid experimental proof that at least four distinct species of rust fungi, all belonging to the genus Gymnosporangium, and all passing a part of their lives on junipers, attack apple in the other stage of their existence causing the sometimes troublesome orange or cedar rust.

The three forms commonly occurring on red cedar in Pennsylvania are readily distinguishable. The most common (*Gymnosporangium macropus*) forms on cedar twigs slowly during twenty months the peculiar smotish, brown swellings as large as a marble known commonly as "cedar apples." In spring and early summer these send out in moist weather, bright orange, elongated, gelatinous horns; and then perish. Second species (*G. globosum*) also forms "cedar apples," but the galls are rough and scaly, and the long gela-

tinous horns are replaced by short protrusions of rusty red masses. These galls persist for several seasons. The third species (*G. clavipes*) attacks larger twigs and causes very slight swelling, but the bark is roughened, and through cracks there protrude reddish masses of spores; it is also perennial, and may attack the low, straggling common juniper as well as red cedar. At maturity, always in the spring months, the reddish or orange spores are produced for a single year in the case of G. macropus, for several years in the case

GYMNOSPORANGIUM MACROPUS.

1. Cedar-apple with gelatinous horns. 2. A spore from a gelatinous horn germinating and producing four infection spores, one of which is detached. (Very highly magnified). 3 and 4. Apple leaf and fruit with the cluster-cup stage of the fungus.

of the other two. With moderately warm weather and continuous moisture for 12 to 48 hours, these spores will germinate in the gelatinous masses, and give rise to a limited amount of growth, and produce within this period a number of smaller secondary spores. As the mass dries, these last become detached, and being exceedingly small and light, are easily carried long distances by the wind, as well

as by insects that feed on the masses. The gelatinous masses may swell and dry several times in April and May, as the showers come and go, giving rise to successive crops of secondary spores throughout a period of three or four, or perhaps six or eight weeks.

These secondary spores are short-lived, and to reproduce the fungus they must meet with suitable conditions of moisture, temperature and food supply within a very few days at most. The food supply must be leaves or the fruit, or possibly the young shoots, of some pomaceous plant, for *G. macropus,* it must be ordinarily apple, wild-crab apple or hawthorn; for *G. globosum,* apple, quince, mountain ash, or hawthorn; and for *G. clavipes,* apple, pear, quince, or juneberry.

The fungous threads, on entering the apple tissues, develop slowly, and it is usually two weeks before the yellow spots are perceptible, and four to eight weeks or even more before they are completely developed. They are distinctly yellowish, early develop minute black dots on the upper side, later produce swelling of leaves toward the underside, and develop on the cushion thus formed a number of little cups with delicately fringed borders. Attack on fruit is near the flower end, the spots growing to be as large as a silver quarter; there is no swelling but the fungous threads grow deeply into the flesh producing a conical, firm, slightly discolored mass. Superficially the black dots occur near the center and cups may be formed at the margin. This stage on pomaceous plants is known as the "cluster-cup" stage, which is closely similar but not identical for the several rust species. A third type of spore is produced abundantly in these cups, and serves to carry infection back to the cedars in midsummer or later, to produce in turn galls that may not mature until as late as the spring after the next, thus bringing us back to the starting point. Unlike the grain rusts, these parasites seem to have no means of spreading directly from cedar to cedar or from apple to apple.

During 1910, in southern Pennsylvania, Maryland, Virginia and West Virginia, there was an abnormally severe outbreak of the cedar rust on apple. The explanation for this is to be found, no doubt, in moist spring weather conditions that greatly favored apple infection. In Center County, Pa., at least, the cedar apples and pustules matured and formed secondary infection spores several weeks earlier than usual, and their production extended over about twice the usual period. Furthermore, moist weather prevailed several days at a time when young apple leaves and fruit were developing, a condition that promotes the formation of secondary spores, and their germination after chancing to reach the apple. The rusts on cedars we have always with us; what the effect on apples will be in any season depends, in so far as we know, largely upon weather conditions.

I have tried to enlarge my limited observations for the past season by seeking information from apple growers in the four states named. The majority of these reports show that red cedars have grown very near badly infected orchards and there is abundant and striking circumstantial evidence of their relation to outbreaks.

Sometimes the cedar trees are reported at a distance of ½ to 1 mile. This is no bar to their being a source of infection. Estimates indicate that a "cedar-apple" is capable of producing upwards of 30,000,000 infection spores; this would furnish 50 for every square foot of a 20-foot fence encircling the tree at a distance of one mile from it; and ordinarily an infected cedar tree produces quite a number of cedar apples. Of course the chances are against most of the infection spores being carried as far as a mile; but certainly many are carried farther by strong winds. The vast majority will chance not to lodge upon a proper host, and of those that do, many will perish in the absence of favorable conditions for germination. But there are enough infection spores formed to insure a certain number finally meeting with conditions suitable for growth.

More anomalous are cases of apples near cedars rusting less than those farther away. Three conditions might bring this about. The varieties growing nearer the cedars might be non-susceptible ones; winds prevailing at the proper time for transferring spores might carry them away from the nearer trees, and towards trees further away in another direction; and thirdly, the cedar trees that were in mind may not be infected with any of the three dangerous species of rust, while some unnoticed cedar nearer the infected apples might be the real source of the rust. For the rust species, although common, do not necessarily infest every cedar tree. In our class work in freshman botany, we have occasion to use a good many cedar apples annually, and we go to three or four lots of cedar trees where they may be had in greatest abundance; all of these have susceptible pomaceous plants growing near.

Two or three correspondents do not know of any cedar trees in their localities, and yet have the rust. If there is no confusion of other apple troubles with the rust, the question arises whether after all a close search might not reveal a few cedar trees that have passed unnoticed.

While some striking cases have been reported of prevailing spring winds carrying infection from cedars to apple, it must be remembered that an occasional blow from an unusual quarter, if at just the right time, may be more potent than days of wind when conditions are not suitable for infection. The question of how far spores may be carried in quantity, is the question of how far any dust-like particles may be carried, and depends upon the force of the wind, its upward or downward path, and the encountering of obstacles. A mile or two seems not at all impossible.

Removal of cedar trees near apple orchards has frequently given highly satisfactory results. The efficiency of this measure will be greatest when the cedars removed are the sole or main source of infection for this particular orchard. Wherever valuable though susceptible varieties of apples grow, cedar trees should be removed from the vicinity as completely as is practicable. Wild pomaceous plants, susceptible like the apple, may grow among the cedars and help to keep up a hotbed of infection ready to extend to neighboring orchards when conditions favor. Such pomaceous plants should be destroyed also. From reports and observations, I have tried to

tabulate a number of varieties according to rust susceptibility. In its preparation error may have come from necessary dependence on unaided memory; from the fact that different assortments of varieties will show differences in the relative rating of any given variety; from varying local chances of infection; from the biennial fruiting of some varieties; from the possibility that different ones of the three species of cedar rust have been involved in different localities; and possibly from differences in individual resistance within the variety.

For fruit infection the most susceptible varieties seem to be York Imperial, Fallawater, Rome Beauty, Smokehouse and Ben Davis. Less susceptible are Rambo, Smith's Cider, Red Doctor, York Stripe, Summer Queen, Bellflower and Winter Banana; while very slightly affected varieties are Jonathan, Stayman Winesap, Baldwin and Northern Spy.

Susceptibility of leaves to infection does not follow the same order. York Imperial seems to be undoubtedly most susceptible. Followed at a distance by Ben Davis, Wealthy, Newtown Pippin, Jonathan, Maiden Blush, Gano, Stayman Winesap and Grimes Golden in descending order of susceptibility. As to resistance sufficient to make the variety practically, if not absolutely immune, opinion must be somewhat more guarded. Grimes Golden is general choice for first place in resistance. In a second class come, curiously enough, York Imperial and Ben Davis, along with Black Twig. A less number mention York Stripe, Baldwin, Stayman Winesap, Northern Spy, Dominie, Porter and Strinetown Pippin.

The effect on yield is variously reported,—from nothing or very little, up to 80% in one case, and 90% in another; these figures being for some special tree or group of trees. When leaves are badly infected during a season, the manufacture by them of food for storage and bud formation is interferred with, and a shortage in the next season's crop from such trees is to be looked for. In some instances leaf attack has been severe enough to prevent proper maturing of the current crop, notably when rust attack was severe enough to cause early defoliation and consequent dwarfing of fruit on the trees. The quality of fruit directly attacked is greatly lowered. Many sold such apples for cider this last season; but with a strong market prevailing others disposed of theirs as No. 2's, or along with the general run of the orchard. Buyers seem not to have been as critical as they may be another season.

From the habits of the fungus, proper spraying ought to control cedar rust on apple. In practice, in closely watched experimental tests, the results from spraying have varied from success to failure. In the light of last year's experiences it seems that routine spraying for scab with Bordeaux, self-boiled lime-sulphur, commercial lime-sulphur and certain proprietary preparations is not a sure and reliable preventative of rust.

Cedar rust shows considerable seasonal variation in the time of infection spore production; and these spores are formed in several crops extending over a period of a month or two. If fungicidal spray aplications are timed according to the frequent swelling

of the moistened spore masses, the treatment will prove costly, and cannot be carried out during periods of continuous moisture.

It is also difficult to apply promptly enough to be effective when the danger is greatest. Where such procedure has been most carefully tried, using Bordeaux mixture, the rust was diminished on the sprayed trees, but not satisfactorily controlled.

We ought to know whether apple leaves and fruit are susceptible equally at all stages of development, or whether the period of susceptibility is somewhat restricted. The constant occurrence of rust spots at the flower end of the fruit is suggestive; although this may simply mean that spores lodge here more securely and have more moisture for germination.

It may be that the disappointing results from spraying are due to the use of fungicides that are less effective against this fungus than against others; for we know that some fungi may be controlled by preparations that are ineffective for others. Several correspondents have noted some reduction in rust from the routine use of Bordeaux mixture or Pyrox; but I have received only one report of pronounced success. I wrote again asking for further information on several points, but in the absence of a reply, I simply quote from the first letter: "York Imperial yield is cut 90% the first 100 feet (from the red cedars); and about 75% the second 100 feet; and about 50% for the next 500 feet. We sprayed with lime-sulphur solution, Bordeaux, self-boiled lime-sulphur, and atomic sulphur. All the other sprays failed except atomic sulphur, which finished up a crop of very fancy York Imperial Apples worth ten dollars per tree within 100 feet of red cedars on my neighbor's land, where the unsprayed trees were not worth picking. Our observation is that no fungicide applied after May 15th will do any good toward controlling cedar rust." I simply pass on to you this bit of experience as it was reported to me, and leave you to judge its merits.

Serious outbreaks of cedar rust are sporadic and so have been the attempts to devise reliable methods of control. In the East and South and Middle West there is the constant possibility of an epidemic, and hardly a season passes without the report of serious loss from some apple growing district. We need to have at our command a knowledge of means of control that can be relied upon in such emergencies.

APPLE BLIGHTS.

By Prof. H. R. Fulton.

It has been suggested that this Association might be interested in a discussion of apple blights; and by the plural form of the word I understand to be meant mainly the various forms of the bacterial blight, caused by *Bacillus amylovorus,* affecting the fruit spurs or new twig growth or the bark of larger limbs and trunk or possibly the crown region of the tree, and perhaps also two or three troubles,

caused by higher fungi, which may resemble bacterial blight superficially in their effects.

The story of bacterial blight is an old one with you, and I have little that is new to bring either from my own work or the work of others. We must keep constantly in mind the fundamental facts about this disease of apple and pear and quince. It is constantly present in most orchards. It is highly contagious. It is transferred largely by insects, and gains entrance through wounds, however slight, and exposed flower parts. It spreads rapidly and becomes

Twig Blight of Apple.

destructive when warm, moist weather conditions favor; this may be at the time of flowering, with destruction of flowers, and later of forming fruit, or it may be late in the season with little immediate damage. It spreads downward in twigs, fruitspurs and water sprouts, finally becoming established within the thick bark of large limbs; it may girdle these killing important parts of the tree; and it winters regularly in such cankers, thus starting new infection the following season.

Blight can be kept out of orchards, but it requires systematic, persistent, thorough-going effort. Affected twigs and spurs must be looked for regularly and frequently at dangerous periods, and removed before the infection spreads to larger limbs, the removal of which would entail greater loss. Trees should be kept clear of useless water sprouts and on very susceptible varities, fruit spurs had best be confined to smaller limbs. In cutting away affected twigs, limbs, and bark canker areas, care must be taken to include all possibly invaded material. In active lesions the bacteria push constantly forward into new regions, and always exist beyond the evidently dead portion. It is a good practice to cut twigs and limbs a foot below apparently affected parts if possible, remembering that if any part of the invaded tissue is left, the work has been for naught. The greatest difficulty is in dealing with cankers on larger limbs, and it is well worth while preventing their development by promptly removing affected twigs and spurs before infection extends to the parent limb. Sometimes these occur in crotches when it is hard to get at them; and always there is little chance to cut away much bark beyond the dead area. But all bark showing any discoloration inside must be cut away if the work is to be successful. In all of this removal work, disinfection of wounds and tools must be carried out. Wound disinfection is placed first because if wounds are clean cut their prompt disinfection will not only destroy bacteria immediately introduced from possibly infected tools, but will offer continued protection for some time to come. If a sponge or swab is carried ,it is easy to touch every cut surface with the disinfectant, and to wipe the tools at frequent intervals. A number of antiseptic substances might be used; probably the best is corrosive sublimate in strength of 1 to 1000, or one ounce to seven or eight gallons of water. Of course, the larger wounds should afterwards be painted with thick lead and linseed oil paint. While it is a safe precaution to collect and burn all infected trash, it is far more important to get it removed from the trees than from the ground. The bacteria die quickly in pruned twigs, some tests made last summer indicating that four or five days is about as long as they can be expected to live in these under ordinary conditions, while on the trees they might continue active development for weeks or months.

In this general connection comes the matter of collar-rot, crown-rot or root-rot of apple trees. The exact nature and all the factors concerned in the development of such troubles, are not understood. It is likely that two or three distinct troubles affect the region of the tree in question. It may be that the blight organism itself plays a part at times, at least in extending the rot. The matter is under investigation, but the problem is a complex one, and work must be carried on for several seasons before definite conclusions can be reached. Meanwhile, I should like to know from you and others as much as possible about the occurrence of such trouble in the orchards of the State. For control, I would suggest the importance of guarding against the spread of possibly contagious material from tree to tree especially in worming. The use of 1 to

1000 corrosive sublimate solution on all wounds and tools is a reasonable precaution in such work. If the affected bark can be reached and cut away thoroughly at an early stage, so that there is a border of good live bark around the wound; and if the wound is disinfected with corrosive sublimate or lime-sulphur and painted with thick lead and oil paint or tar, so as to promote healing, the lives of some of the affected trees may possibly be saved. I realize the difficulty in most cases of reaching the underground parts satisfactorily and of applying these measures in advanced stages of the disease; but I do not believe it is worth while making an effort to check the spread and to prevent early girdling of the tree. In some cases bridge grafting may be resorted to advantageously.

Another thing to do is to give each affected tree every chance to make vigorous, thrifty growth, and as we say, to outgrow the trouble. The sooner the diseased condition is recognized, and these methods adopted, the better the chances for success. If the soil seems thin or packed, resort to judicious fertilization or cultivation. Guard against drouth conditions by adding humus or by mulching or by practicing shallow cultivation. Try to give the sick tree proper food and moisture and soil conditions. Check the natural tendency to over-bearing that comes from partial interference with the normal transportation of food from tops to roots; the tree will need as much building material as possible for the replacement of the diminished root system. Therefore, prune judiciously to retard top growth and to reduce a large leaf area that would make excessive demand for water upon the roots. Thin the fruit freely or remove it entirely. It is well worth losing a crop or two from an infected tree if the life of the tree can be saved thereby.

I would like to discuss the other bark and wood diseases found in our apple orchards, but time does not permit. In general, for all of them, the means of control are the prompt recognition of the disease and thorough destruction of affected parts, which serve as sources of further infection; and the disinfection of wounds, and along with these some missionary work to induce our neighbors to follow our example; and effort on the part of all to put out of existence the worthless wayside trees that so often carry over such pests from season to season.

A Member.—Does cedar rust have any effect on the growth of the wood?

Prof. Fulton.—Yes, it does sometimes affect the growth of young stock.

A Member.—Does it affect the apple?

Prof. Fulton.—Yes, sometimes; certain varieties, rather seriously.

A Member.—Does it spread from the leaves on the ground over to the apple trees?

Prof. Fulton.—No; the rust fungus in apple leaves that fall on the ground does not affect the trees; the way it works over is from the cedar branches. It develops slowly there during that winter, and also the following summer and winter. I did not make the point emphatic; but it does not spread from apple to apple, nor from cedar to cedar; it must come to the apple from the cedar, and to the cedar from the apple.

A Member.—Do you know any similar fungus that attacks the Yellow Locust?

Prof. Fulton.—No; I know of no fungus that attacks the Yellow Locust and the apple in common.

A Member.—Do you think that cutting out the apple trees affected with Collar Rot would decrease the percentage of loss in all the orchard?

Prof. Fulton.—No; my point is that the trees we are treating may, in the event they are attacked by collar rot, be a total loss in two or three years. By individual treatment they may live on, and in a few years again give us crops.

With reference to the cedar rust or orange rust of apple which I spoke of first, it is a fungous growth, and it passes its life on the red cedar as well as on apple. The principal means to overcome it, so far as we know now, is the destruction of the red cedar near orchards. Our knowledge of spraying operations, at this time, is not sufficient to lay out any certain course of action. It attacks the fruit and the leaf, and sometimes the young shoots.

A Member.—Are there many cases of collar rot known to be in the orchards at the present time?

Prof. Fulton.—Not a large number of cases; but it is our business to see that slightly affected trees do not get into hopeless condition.

A Member.—Do you think there would be any danger of propagating it in young trees by taking scions from affected trees?

Prof. Fulton.—I cannot answer that definitely, but in a general way I can say that there is such a thing as individual as well as varietal resistance to disease. I would prefer to propagate my trees from strong trees, rather than from diseased trees.

Mr. Wickersham.—Would you advise planting a tree in the same hole in which there has been a diseased tree, and, if so, what treatment would you advise.

Prof. Fulton.—That is a point on which I have very little to say, because we don't know anything about it yet. We cannot say definitely what the effect would be.

Prof. Surface.—You very properly offered a word of caution about carrying diseases on implements used on trees. I would ask whether there is a possibility of Peach Yellows being carried by implements used on diseased peach trees?

Prof. Fulton.—There appears to be a good deal of contradictory evidence on hand on matters of this sort. In a general way it is thought that the Yellows is not carried from place to place on implements used. There is also a belief that this has taken place. I should like to know first what the Yellows is, and also what the conditions for its spread are. It is always wisest to be on the safe side, and to get the diseased trees out of the way.

A Member.—In case you have peach trees that you suspect have the Yellows, and you take them out, what special treatment would you recommend for the soil before planting another tree in that place?

Prof. Fulton.—It is usually supposed that the Yellows is not transmitted through the soil, and trees have been successfully planted without any special soil treatment.

Prof. Surface.—Mr. Chairman, I was very much impressed by the points brought out by Mr. Powell here, and in answer to an inquiry which I submitted to him, he gave one point which seems to me to be the most important point of the discussion. I may be mistaken in my views, but I think it is a matter of record in our minutes that I have advocated this same point, so that what Mr. Powell has done may be a matter of more or less value to us. You will notice that the excellent results he obtained from his currants were not obtained by propagating from either very young wood or very old wood, but from the individual bush. It is a matter of individual selection. We must recognize the fact that individual selection gave the results in his currant yield.

Now, he says, that he selects a well-developed bud for his tree in budding; he selects it at a period of the year when some of the buds are developed but others are not, and thus he gets his bud variation. We know that every bud has the possibility of becoming a tree just as soon as it is set in another tree. I am inclined to think that the success of Mr. Powell is not due so much to his propagating from old wood, as from advanced individual buds. I think we can recognize the fact that there is individuality in trees, just as there is in horses or men, or anything else. If we want a young-bearing tree, we can select our stock from a young bearing tree. I have a Winesap that bore last year, less than three years old, the only tree in the orchard that bore fruit. I believe if I propagate from that tree, and continue this kind of selection, I can produce a young-bearing strain. I believe that the principal point in propagation is to recognize the properties we wish to find, in the individual tree, and then propagate from that tree—take our scions from that individual tree. It is not so much a question of old wood,

or new wood, as it is of the individual properties we wish to select, which, however, are not made manifest in the fruit until the tree begins to bear.

I only wish we would carry out the excellent principle advocated by Mr. Powell in developing a tree that is resistant to disease, and to frost, and to fungous growths. Those of you who were at the meeting at Lancaster several years ago may recall that I made the statement there that I believed it possible to develop a disease-resistant tree, and asked for the names of varieties showing this tendency. Our President said that the person to name them was Mr. Surface himself. Then I had had no personal experience in practical tree development; I was simply trying to find out whether there was such a thing known to growers by their own experience.

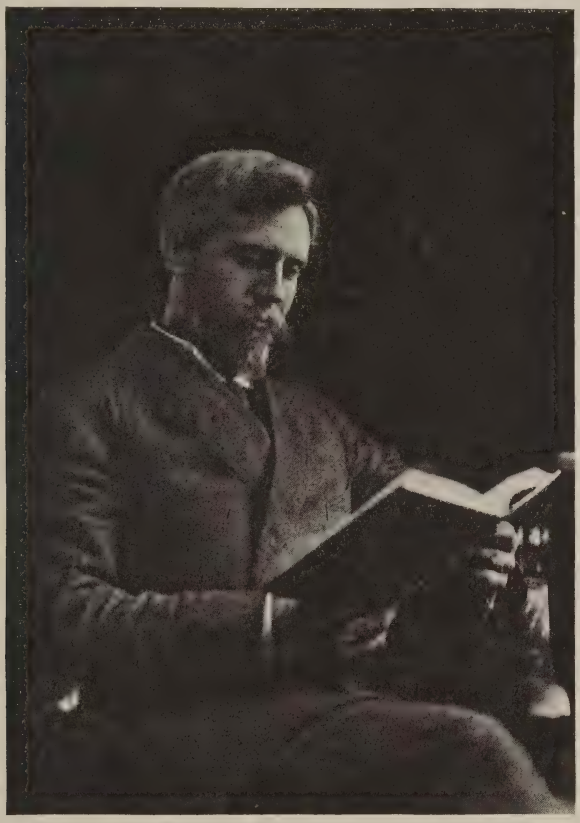
I appreciate very highly the excellent talk of Mr. Powell and am glad to be allowed the opportunity to express my appreciation.

A YEAR'S WORK IN DEMONSTRATION ORCHARDS.

By Professor H. A. Surface, *Harrisburg, Pa.*

Mr. President, Ladies and Gentlemen, Fellow Members of the Society: It should be very encouraging to us to see the progress along the lines of horticulture, because of the justifiably high rank that Eastern grown fruits, and especially Pennsylvania fruits, are taking. Tree planting has increased largely all over the State, not only in the commercial line, as shown by that magnificent exhibit over in the hall, but thousands of individual growers all over the State show a high rate of progress in many different counties. You and I know that a few years ago, we had dark days of discouragement. Planting in Pennsylvania was reduced to the lowest possible stage, for the discouragement was justifiable. The orchards in Pennsylvania were being destroyed by the San Jose scale, and by other pests. It was necessary to do something to eradicate them, and to do it quickly and thoroughly. Many and many a man was tearing out his trees by the roots in the belief that they were hopelessly affected. It was the duty of the Department of Agriculture, through the Division of Zoology, to try to overcome this. We commenced publishing bulletins telling the people how to spray. It was good, as far as it went, but it did not go far enough, so we were compelled to go out into the highways and by-ways and compel them to see. There were many persons who were willing to try it on their own responsibility, but many of them were so hopeless and discouraged that they did not even care to try. To overcome this, we had to go out and do the work ourselves, and risk our reputations on the result of the work. And when we did go out, it seemed, as one man said, that we were expected to take the worst and most dilapidated orchards and make them perfect specimens. You cannot do that any more than you can take an old, kicking bronco and make of him a lady's horse; but where we have had conditions that enabled us to do good work, we have had good results.

We have found that the lime-sulphur solution, and the arsenate of lead, will do all the necessary work, and you know, my friends, what a blessing it will be to horticulture to know without a doubt that the concentrated lime-sulphur and arsenate of lead is all that is necessary for a summer and a winter spray. I think the time is close at hand when we can say that the lime-sulphur and arsenate of lead will control all of the pests for which we have had to spray. This subject comes up later in the afternoon for further discussion, and I shall not further speak of it now.



In a few minutes there will be brought into this room, a map showing where the demonstration work has been carried on. The demand for demonstrations was such that we could not attend to it except in about one case out of a dozen. Then we arranged the Supervision Orchard Plan. We went to the orchard, met the owner, looked at the trees, pruned some and showed him how to make the concentrated lime-sulphur solution and apply it, prescribed treatment for the coming year and then left the work with him, helping him by correspondence, as at all times, with all persons who request

services by correspondence. We find, now, however, that we cannot even get to these Supervision orchards without dozens of people coming when they know the demonstrator is going to be there. We find no difficulty in getting an audience now, at any time or anywhere; often they number five or six hundred. I have a letter from a lawyer at Scranton, in which he says that when the demonstrator came there to supervise the spraying of his orchard, the weather was so bad that they only went out and looked the orchard over, and then came back to his greenhouse, where there were sixteen persons gathered to take instruction.

We find this getting into personal contact with the grower and showing him his needs, and the needs of each individual tree in his orchard—for each tree has an individuality of its own, just as every cow, or horse, or man has—is the best means of obtaining good results. It is hardly worth while for me to stand before you and tell you what results we are having, or *you* are having, because you are the people who get the results. I can point you to a dozen people in this audience who are getting better results this year, by these methods, than they ever saw before, on the same trees, but our cry is not so much "more fruit" as "better fruit."

The rush for tree planting has already passed beyond the experimental stage. One of our largest nurserymen told me recently that he had sold more nursery stock in Pennsylvania the past year than in any other state in the Union, and it seems to be the opinion of our nurserymen that this tree planting is increasing very rapidly. You ask, "what will be the result?" It will be a great deal of very good fruit, and a great deal of very poor fruit. There are still many people who imagine they can start an orchard, buy a tree and put it in the ground, leave it there without attention, and then get good results. Any man who does this will fail. He must be there on the spot, and he must know his trees and his subject. If he does not, he will fail, and he had better stop at once, before going into any extensive planting, which would mean greater losses.

In this same building, there is a general agricultural meeting now going on, at which the attendance is about one quarter what it is here. At the same time, stop and compare the profits you received from your fruit trees with those of the general farm crops on the rest of your farm. It is scarcely worth my while to give you figures but let me tell you that the attention of America is being turned to Pennsylvania, because of the magnificent fruit our people are growing— as fine as anything the West ever produced. In our fruits we can produce the size and color and we have also the quality, and we save over fifty cents per bushel in freight. I know of three men who are now selling their Western fruit lands to come to Pennsylvania to grow fruit. I have here a letter from a man who has sold his Oregon lands at $2,000 an acre to come here for this purpose. We have all the possibilities of success. We have the climate; we have the soil to grow fruit; it simply takes modern methods to develop it. If the average Eastern man were to go West and attempt to grow fruit in the same slip-shod manner that he does here, he would fail; and on the other hand, if the Western

man were to come here with his methods, he would be able to grow more and better fruit, without the expense of shipment. The chief effort of the latter would be directed toward more thorough pest control.

Seeing the danger of these pests, we commenced to spray with the lime-sulphur solution to control them. At first we had to consider it in the light of an experiment, because we did not then know whether it was right. The office of your Economic Zoologist was among the first to advocate it, and what is the result? You have heard it at this meeting. There are orchards in this State that were thoroughly infected with scale, but which are now absolutely free, and producing magnificent fruit. We are receiving letters from Kansas, Iowa, Texas, Virginia and Ohio, inquiring regarding the fruit lands of Pennsylvania, and in most of them they say they have been attracted to this state by our demonstration work. In this, as in other things, the pioneer must necessarily bear the blunt of blazing the trail.

(Map showing location of demonstration orchards shown here.)

In addition to this list of demonstration orchards, we have over eleven hundred farms as supervision orchards. We are gratified to learn of this success. I will call on two or three of my inspectors to take a few minutes of my time to tell you some of the results they find.

Taking some of the counties in order, we find in Adams, at Mr. Lupp's orchard, one year ago we had a few, a very few persons present at the demonstration meeting; this year we have received eighteen different requests from the town of Biglersville alone, asking us to undertake the supervision of their orchards.

Allegheny.—Oakdale Orchard Co., Major Nesbit: Some of these trees were cut back one-third, and Major Nesbit reports that the result last year was certainly fine.

Armstrong.—Rev. Mr. Kerr reports that the work of the demonstrators is serving as an inspiration, and they are waking up to the needs of tree pruning, fertilizing and cultivation. "This work has been of untold assistance to the citizens of Pennsylvania."

Berks.—One of my inspectors received this communcation: "You no doubt remember that you conducted a public demonstration in my orchard, and you will perhaps remember how discouraged I was, and how you tried to encourage me by saying, you can easily save that orchard; if I only had one like it, I would be glad. Well, we have saved it; we have the scale under complete control. One of my neighbors told me I wasted more material than he used, but I told him I would save what he lost."

Here is the fundamental principle for success in spraying: Use the right material freely and strong enough and do thorough work.

A prominent Berks County grower writes us that if it had not been for the demonstration work, his trees would have had to be cut down, but the scale is now under complete control. He adds, "We cannot afford to give up this work."

Only recently I was in Ohio and I saw persons there cut down hundreds of trees because infected with scale. I am glad we are showing the people here how to save them, rather than cut them down.

In Bedford County we have some of the finest fruit in Pennsylvania. At the Pittsburg Land Show, the Jonathan apple grown by Brother Richards, received special attention and first award. His trees were once completely infected, but he sprayed with lime-sulphur, and now has the scale in full control.

From Bradford County I have a communication saying that the results of spraying were very satisfactory. Mr. Fred Bohlayer, of Troy, writes: "I suppose you will want to hear about the work done by the State in our Model Orchard. The results from the work done in the spring are certainly a surprise. While most of the orchards bloomed full in the spring, most of the blossoms dropped off, except those that were sprayed. In this part of the country there are scarcely any apples. In our own orchard, in which you gave the demonstration, I have about six hundred bushels. They are selling here at a dollar. There are scarcely any wormy ones, as I have no trouble with the worms."

We have found that the lime-sulphur is also a preventative of the blister mite, if applied while the trees are dormant.

As you get closer to this map, you will see that the white pins stand for the demonstration orchards, and the black pins for the supervision orchards, and there are one and a half times as many of the latter as of the former.

This letter of Mr. Bohlayer's, from Bradford County, also speaks of spraying the King apple. "The King trees rather looked as if they were going to die last year, but after spraying with the lime-sulphur, there was no trouble; we sent a box of these apples to the Land Show in Pittsburg, and if you are there, would like you to take a look at them."

Blair County.—I want to ask our friend, Mr. Kloss, what the results have been in his orchard?

Mr. Kloss.—I cannot tell you the full results, but I want to give you one or two examples. We have a number of Spitzenberg trees, two near the house, and the others over the orchard. We sprayed and pruned the two near the house, but did nothing to the others. Mrs. Kloss is the orchardist, and this is what she found: On the two trees that were dehorned (pruned) she got five bushels of first-class, and one of second-class apples, and on the others to which nothing was done, one bushel of first-class and five of second-class apples.

Prof. Surface.—In Carbon, which is a coal region, but in which some of the very finest fruit lands may be found, Mr. Gangaware writes, "The orchard seems to be in a flourishing condition; the work done by your men was greatly needed and highly appreciated. Let us hope that the next Legislature will provide funds for this demonstration work to continue."

From Chester County, likewise, we have had remarkable results. I should like Mr. Windle to tell us the results of the demonstration work over there.

Mr. Windle.—I don't think the results have been so remarkable, possibly, as some others, but they have been very satisfactary. I can say that at the County Home, the Spraying was handicapped in a great many ways, but they are highly pleased with the results. They never had much fruit over there. They cannot get fruit like at other places, because the inmates destroy the fruit, but Mr. Garrett is so pleased with the results that he advocates the lime-sulphur spray whether you have scale or not. There was another demonstration orchard, but no work was done there owing to the sickness of the owner at the time to demonstrate. We pruned and sprayed for the San Jose scale and the Codling Moth—one spraying to one tree, and yet the result has been conspicuous. The owner said he had never had such fruit as he had on those sprayed trees. That was Mr. Quinn, over in Brandywine Township.

Mr. McNeil also had good results, and it was announced in the papers. Mr. Alexander, a large commission dealer, had it cut out of the paper, and pasted beside it the report of a man in the Southwestern part of the state who had had no results and did not spray; and he added, "Go thou, and do likewise."

Prof. Surface.—I show you these two branches, the larger one killed by the San Jose scale, and the smaller one by the Oyster Shell scale. The latter is found chiefly in the mountainous regions of Pennsylvania, not in the Eastern or Southeastern portions.

Does Squire Loux have anything to say about Bucks County?

Mr. Loux.—The best recommendation, I think, is the number of supervision orchards that are asked for. We sprayed last year at the Farm School, and we have made good. We have succeeded in raising the grade every year in the apple orchard. We have a large orchard that was almost practically killed by the scale. We dehorned and sprayed it, and this year the crop was about half. I think the results indicated on the map there will show that we have made good.

Prof. Surface.—From Butler County we have a similar record.

Cambria County—We had two demonstration orchards, one of which produced remarkable results, and the other did not. There are cases where the trees need something else besides spraying, something else besides pruning. Soil and climate have much to do with results, and then, again, we must not expect a hundred per cent. the first time we spray.

Center County.—Col. Reynolds sold $20,000 worth of peaches from the orchard in which we gave the demonstration. There were quite a number of students from the College, as well as many other people there to meet my inspectors. In Mr. Brinton's orchard we sprayed one side of a tree; how about that tree?

Mr. Brinton.—There was three times the growth on that side of the tree that there was on the other.

Prof. Surface.—I want to say that I know no man whose knowledge of our methods is better than that of Mr. Brinton's.

Delaware County.—I have a letter from a very prominent citizen, at the demonstration in whose orchard I was present. He says "We have learned more about the Yellows than we have ever known, and I hope to profit by it so that I will never again have to take out half of my bearing trees, due to failure to take out a tree that looked healthy. The San Jose scale is now so scarce that it requires a search to find any, except on one tree. The apples are finer this year than last, and in the two years, besides having all the apples we could use and some to give away, we have sold enough to pay for our spraying apparatus and labor. We have good, healthy trees, all due to your advice. Your advice to spray, spray, spray is producing very good fruits, with very good prospects for the future, and for the life of our trees. We thank you. It is good to see the interest in the work that is starting in our neighborhood. The best of it is that every one who sees the results is getting a spray pump and using it."

In fact, we will undertake no demonstration work, or supervision work, until the owner will agree to get spray pump and use it.

If Dr. Cleveland is in the room, I wish he would tell us some of the results in his orchard of very young peach trees.

Dr. Cleveland.—They have grown until they have a caliper of nearly two and one-half inches.

Prof. Surface.—Every once in a while I receive a letter concerning our inspectors, and their thorough knowledge. From Delaware County comes a report like this: "Your inspector spent the afternoon in my orchard. He is faithful and earnest in his work, and I want to congratulate you on the character of the men you employ."

From Lawrence County I have a newspaper clipping headed "Johnson gets $8,000 for his apple crop, and his brother gets $6,000 for his apple crop." Rev. Mr. Johnson, of Newcastle, writes me that he is getting the best results from spraying, and says "I am delivering 42 bushels of apples per day at $1.10"—making $46.20 a day.

My time is getting short and I can not take time to mention details of results in all the counties, as I had intended, but I wish to say that the report from Lycoming County is to me of special interest and value. The writer, Mr. Wilson, says: "I wish to tell you of the results of spraying and demonstration. I have about 1,000 trees. In 1903 I had about 2,000 bushels of good apples; in 1904, about 1,000. In 1905, a buyer, a gentleman from your city came and looked over my cellar and said, ' I will take your Paradise,' but

refused all the others because of the condition they were in. [His crop was running down.] In 1906 and 1907 it was hardly worth the trouble of gathering. [He got down to the discouraged point.] In 1908 it was but little better." In 1909 he purchased a spray pump and commenced to spray under our supervision. The trees were sprayed twice, with Bordeaux and with lime-sulphur, and, he writes, "We had 1,500 bushels. Our mistake was in not spraying with arsenate of lead." This year he sprayed with it, and had 1,400 bushels of nice large apples, the finest his orchard has ever produced. "It is not that I want to take any honor in writing this," he writes, "but to express my appreciation to those of you who have been hammering away at us fellows, telling us what to do. A number of people are starting orchards in this and adjoining townships, and we are going to organize a Horticultural Society."

I have not taken the time to prepare a paper; the stress under which I have been working for the past few days is my excuse for this, and I trust you will pardon it.

In conclusion, as the result of this success, all we ask is that you give us your kind and cordial sympathy and co-operation, which we have had heretofore. The work that has been started is necessary for the continuation of your success. We aim to meet the needs of the people, and we invite your friendly criticism. We have the satisfaction of knowing that we have been of public service, and the gratification of receiving in return, the support and expressions of interest of our friends.

The President.—I want to say that this is a very gratifying report of the work being done by Prof. Surface's demonstrators. They must feel very much gratified at the success of their efforts, but we don't want them to get swelled heads over it; we want them to go right on and do better things next year.

TUESDAY, JANUARY 24, 7.30 P. M.

Vice-President Eldon in the Chair.

THE RELATION OF THE SOIL TO PLANT LIFE AND THE VALUE OF TILLAGE FOR ORCHARD DEVELOPMENT.

By George T. Powell.

Mr. Chairman, Ladies and Gentlemen: On the subject for discussion this evening, "The Relation of the Soil to Plant Life," practically depends the continuance of our entire work. As a nation, we have enjoyed for a period of perhaps two hundred years, the greatest prosperity. We have been the best fed nation in the world during this time, and have accumulated great wealth. In fact, we have, as a nation, accumulated in the last three centuries, greater

wealth than has England during two thousand years. How has this been accomplished? Simply because we have been given a soil richer than any other in the world, and we have been taking the wealth out of it and using it to build up our great nation. In the past three or four years, there has come over our nation a surprise in the unexpected and sudden rise in the cost of living. It has affected our entire population, especially that portion of it living in our large cities. The country has been drained of its population, and millions are congregated in cities, and we are now confronted with this problem of the cost of living, which has ranged upward from 30% to 300%. Now we are confronted with the problem of giving back to the soil the fertility which we have been taking out of it for more than two hundred years. We have been taking out and putting nothing back to replace the plant food that is necessary to retain the fertility of the soil. We are now to meet the problem of the depletion of our soil, while our yields per acre must be increased. In the past two centuries we have increased our yield of wheat per acre but two or three bushels; England has far exceeded us in that respect. In England, the average yield per acre is thirty-four bushels, while in this country it is but fourteen and a half. We have been increasing in population but nowhere have we correspondingly increased in production. As I said to-day, we find millions of people unable to eat apples, because of the exorbitant prices demanded for them.

Another point I wish to speak of, is the reckless destruction of our forest lands. We have swept across our great continent, and cut away our great forests until we have subjected our soil to the dryness that comes to a soil denuded of its trees. Not only is our soil becoming depleted, but there are places where our water supply is becoming exhausted. The last year has been remarkable for the depletion of our water supply. Many of our large cities, especially in the East, have been suffering as never before, for want of water. Towns and cities in New York were weeks without water supply in their houses and on their farms. We are now paying the penalty for the wholesale destruction, for soil depletion, and our forests, and it is necessary for us now to do something to restore this plant life and to renew the fertility of the land.

I desire to discuss this evening the relation of the soil to plant life, and what we may do to bring it up again. In the first place, we know the extent to which every tree, and every plant, and every flower that grows is dependent on the soil, for its life, hence the necessity of understanding that each year the ability to sustain plant life is lessening, and that unless something is done to replace this lost fertility, each year is lessening the supply, and increasing the cost of living to humanity.

I may say that the soil is nowhere near exhausted of its plant food even to-day. I don't believe that there is any danger of exhausting the soil anywhere in this country. We have millions of acres of depleted soil, but not one acre of exhausted soil in this country. The Great Creator was wise in his provisions for maintaining all life and he so placed them that it is practically impossible

to exhaust them. We have reached the stage where the soil is beginning to disown the people who have abused it, and that is why we see the cities crowded to-day. Many people who thought they owned their farms find that the injured soil has disowned them and driven them away because of the neglect that was shown it.

Now we want to consider how most economically fertility may be restored. There are methods which may be employed to build up needed plant food. Some of them are very simple. Away back in the sixteenth century there lived a man by the name of Jethro Tull. He was a great student of the soil, and he discovered that tillage was a very important factor. He thought he discovered that plants actually took up particles of soil as food. He was a student, and left a book in which he tells of the increased yield from tillage. He is the first writer on the subject of tillage. We know now that he was mistaken in his theory that plants take up particles of the soil, yet no man has done more for the improvement of the soil than did Jethro Tull, because he first discovered that by tillage we can increase production. Why? Because there is hidden away in the soil enough plant food still to meet the demands for centuries to come.

Next to the tillage comes another question of green crops. I want to apply this directly to the orchard this evening. In setting out an orchard, it is necessary to understand the soil, its character, type and quality. There are many orchards set out to-day on the wrong type of soil. I said this afternoon that there are millions of trees planted that are not producing fruit. One reason is that there are many trees planted on soil that is not suited to the production of the apple. That is one of the reasons so many trees planted add nothing to the increased production of fruit.

There on this chart are shown two distinct types of soil. On the right side you will see entirely distinct types of soils. It is of the oldest limestone formation; here you get the clay soil and the clay loams. On this side of the chart are the sandy types. This sandy type will almost always be found along the coast. Along the Atlantic coast, particularly, you will find it, and it is generally well adapted for market gardening; therefore, along the coast line from Maine to Florida we find the market gardens more than elsewhere.

As we go back from the coast we find the more mountainous country; here we have more of the limestone soil, and here is where we get our finest fruit. The old limestone is not in every part of our country. We find it in California, in Washington, in Oregon, then in Colorado, in Michigan, then on Lake Champlain, in New York, and along the Hudson River Valley, where you get this soil, you can grow trees and fruit as you can nowhere else. So it is important that when a man is first starting to invest money in the fruit business he should know something about the soil, so that he may make no mistake in his location.

Here on the chart is a form of soil known as "Hardpan." I remember a number of years ago in going over your state, I came across a small stretch of country where nothing seemed to flourish as it should; the farms did not show a prosperous appearance, the

trees and the woods looked stunted, the houses and barns were small, and the people themselves were poor and not prosperous. I found that the soil was made up of this type of hardpan. This hard sub-soil that comes up to say, within six inches of the top soil is very unfortunate for farming. You will find sections in the East and in the West, with this kind of soil. Impervious to water, it works like a cement floor, and is a very poor fruit soil. It is always either too wet or too dry, and can not be well tilled.

Then here is the very sandy soil, which is almost as bad for fruit. It is almost always dry; the moisture and the manure applied seeps through it in a short time, and leaves it dry and crops suffer for moisture.

Then, knowing our soil, we must begin the practice of right tillage and give to plants the conditions they need. Our finest soils are clay, or clay loams, but by tillage we can increase the productivity of all soils. The one principle of tillage is to make available the plant food that is in the soil. That is why clover is so difficult to grow to-day, because certain forms of plant life have been depleted and acid conditions have developed that are injurious to the growth of clover, which grew so luxuriantly in your state not so many years ago. In the last sixteen years, since I have been experimenting with clover, I have increased the productivity of my soil one hundred per cent, and I have spent but little for commercial fertilizers, although I am a believer in them. By tillage you can release the plant food that is still abundant in the soil, and set it to work to sustain and to make large crops.

In my orchard practice, on the farm that was owned by my great grandfather, who raised hay and corn and wheat; the same policy being followed by my grandfather and father when I began to farm, I found the orchards were not bearing as they should. I discovered that the plant food had become much depleted. If you will allow me a little of personal history—My father was a good farmer and a good business man, and he helped others in bank backing until one of these senseless panics came along and swept away his friends and his accumulations. When I inherited the farm of one hundred acres, I also inherited with it obligations of $10,000. Most of you will think this was a pretty heavy burden for a young man just married. The first thing I did was to set about studying the soil and how to improve it, and I have never failed to pay one hundred cents on the dollar, and the farm today is better than it ever was, and covers at present nearly three hundred acres.

I believe that it is possible for most any one to take soil, and to begin without a dollar, and make it provide support. In order to do this, I believe it is only necessary to study the philosophy of tillage, and follow intelligent practice. What does the clover plant do for us? Every time we use the clover plant—especially if we use the Mammoth clover—it sends its roots down into the soil and loosens up the sub-soil and brings up the plant food that has never yet been touched. It brings up the phosphoric acid, and potash and adds to the soil nitrogen. The clover plant, like other legumes, such as cow peas and beans, have the power to take from the air

itself nitrogen, and help to build up the soil by adding to it the nitrogen that we know it needs. It is like a miracle, this building up of the soil by the legume plants. I have improved my soil principally by the use of clover, and it is a pleasure to go over my farm year after year and see the improvement that is taking place by means of the plant food that I am putting back into it. I remember a number of years ago when I first came to this state and advocated in your institute work the sowing of crimson clover, the fol-

Low Headed Apple Tree—8 Years Old.
Orchard of George T. Powell—Dwarfed by late summer pruning.

lowing year I was asked to go over portions of your state and make a special study of your buildings, your cattle, and your farms, in order to be able to discuss the subject even more effectively, and in going over the Pennsylvania Railroad through some beautiful sections of your state, here and there I saw fields dotted with crimson clover in sections where I had advocated it in the institutes. I knew there were the elements of fertility being added to the soil, and I never traveled anywhere with greater satisfaction than I did at that time when I saw the Crimson Clover that had been sown in the corn fields. I am firmly convinced that you can grow crimson clover in your state and thereby restore to the soil much of its lost

fertility. You have a wonderful power in your hands, and can use it to build up your soil, and add to it the nitrogen it wants, largely taken from the atmosphere.

Another important point in tillage is this: We must have moisture in the soil as well as plant food. I have recently made an examination of a large stretch of country in New Mexico that was opened to irrigation. I spent several weeks in studying the effect of water upon the arid lands of that state, and when coming back to my own farm, I found in the midst of a very dry season, just as beautiful apples, just as red and as fine as in that irrigated country of New Mexico, where they have to sink wells down 200 or more feet to obtain a supply of water. I found a beautiful crop of apples on my farm, because I had by tillage saved the moisture of the year before. I don't believe that we will ever have to spend a dollar for irrigation in the East. All we have to do is to save the water by tillage. As the season advances, the temperature rises, and becomes higher and higher on the surface; then there comes the pressure of the moisture in the soil, pressing upward to be evaporated. Now, how much moisture do you suppose one acre will take out of the soil in twenty-four hours? Every dry day in June, with the North wind blowing, every single acre of meadow grass will take up one hundred tons of water. What will a single large tree take up? It will require about six and one-half tons of water every twenty-four hours. Then, we must make a point of conserving this moisture, and that is done by the stirring and re-stirring of the soil until we hold back the water supply that is so abundant in this subsoil.

I made an experiment in peach culture a few years ago. In starting in at the beginning, I had followed the methods of the peach growers of Michigan. I began in this orchard the system of daily tillage, and continued it until those peaches were ripened and marketed. That season we did not have a rain fall of an inch from the time the peaches were one quarter grown until they were marketed. Every day that orchard was harrowed, one day in one direction, and the other in the next. While we were marketing the early ones, the harrowing was still going on for the later ones, and while the market was filled with peaches selling at fifty cents a basket, I did not sell a carrier for less than $2.50. You may say that was expensive; so it was, but look at the returns from an acre of peaches at that price. It proved that we can successfully provide against drought by proper tillage and without irrigation.

A Member.—Did you roll it, or break it any?

Mr. Powell.—It was simply run over with a fine tooth harrow, and the finer we could make the surface soil the better we found it to be in holding the moisture below the soil—four inches down was moist all of the time. Now I want to show you in just a few minutes the results of some very effective work along this line and with clover culture.

A Member.—What effect would that have on "Hardpan?"

Mr. Powell.—Well, the "Hardpan" is so packed that you can not get the water through anywhere. "Hardpan" is a clay soil with no vegetable matter in it. It is of the nature of cement and very difficult to handle.

Here are just a few figures which will verify all I have said, and which I will explain to you: In one portion of a pear orchard were sown eighteen pounds of crimson clover to the acre. We cultivated the orchard up to about the 5th or 10th of July; then we sowed the crimson clover. That is for apple orchards.

In another portion of this orchard to the right, no clover was sown. At the end of three years, when we were introducing into the New York public schools lessons on the importance of teaching some of these things in the schools, I had some of the students visit my orchards, and with them was a chemist from Cornell, and he was so impressed with the soil that he requested me to send him samples of it for analysis, and this is what he found:

In the three years of the clover-treated land, the water contents showed 15% as against 8.75% on the land not put in clover. Nitrogen .20%, as against 12%, and humus 2.94% as against .94%. There is where the explanation comes in. The phosphorous was .015% as against .008%. 6.25% more available water from the clover-treated soil. That 46,000 tons per acre of water means a big thing to us in a dry season. He also found that I had added .09% of nitrogen, which equals 1350 pounds; of phosphorous .007% equal to 105 pounds.

A Member.—Any gain in potash?

Mr. Powell.—He made no analysis of the potash. He desired to find what effect the clover had in adding nitrogen and humus.

A Member.—Do you have any trouble in having crimson clover freeze in winter?

Mr. Powell.—It is true that crimson clover sometimes freezes in winter; therefore I advocate Mammoth clover with it. If you can get, as I do, from 20 to 26 inches of crimson clover before November, it does not matter whether it freezes or not, because we have the nitrogen and roots in the soil. After we have gone to the trouble of making this soil so fine and rich through clover and tillage we must protect it, or we will lose a great deal of the nitrates we have produced and set free. Put on rye, if nothing else, so as to keep it covered during the winter months.

A Member.—How much does the crimson clover grow in a corn field?

Mr. Powel.—I have had it 8 to 10 inches. Four-inch growth is well worth getting in corn.

A Member.—But not after the crop was harvested?

Mr. Powell.—No. The growth is slow until the corn is cut; after it is cut it will make a stronger growth. In the orchards the growth is much stronger.

Prof. Surface.—What is the height of your corn when the crimson clover is sown?

Mr. Powell.—About four feet high. We cultivate just as long as we can, and then the clover is sown just before the last cultivation, and after the corn is cut, then, of course, it covers the soil stronger.

A Member.—How much do you sow?

Mr. Powell.—Eighteen pounds to the acre, half crimson and half mammoth clover.

A Member.—When do you stop cultivation?

Mr. Powell.—About the 4th to the 10th of July in New York.

A Member.—Do you think you get better corn by using the clover?

Mr. Powell.—Yes; we think so. We think the corn gets some benefit from the clover.

A Member.—What is the best time to turn it in?

Mr. Powell.—I prefer to turn it in in the spring, because you have the winter protection then.

A Member.—When do you turn it in in the spring?

Mr. Powell.—Just as early as possible, because every day you leave it unturned, it is taking up moisture from the soil. If allowed to grow in the spring it will take out of the soil tons of water daily. We must prevent this by plowing in early.

A Member.—How do you cultivate with your apple trees headed so low as you said this afternoon?

Mr. Powell.—Well, I believe in clean tillage in the orchard; I believe in low-headed trees. We will have to change our entire philosophy of orcharding here in the East; we will never be able to overcome or meet the competition of the West as long as we have trees forty feet in the air. We will never control the San Jose Scale or the Coddling Moth with trees thirty or forty feet high. My plan is not to prune trees until they are four or five years old, and then the pruning is on the top of the tree, cutting out the leading branches there.

Prof. Surface.—I thought you pruned it when you set the tree?

Mr. Powell.—I do; and then leave it alone for the next four or five years.

A Member.—How high do you make these trees?

Mr. Powell.—In setting out a two-year-old tree, if it has been top-worked and prepared in the nursery, I cut it so that it stands about four feet; should cut the main head of most varieties at three feet.

A Member.—How old are your trees when you stop cultivation of your orchard?

Mr. Powell.—I never stop cultivating. I have one orchard that my father planted seventy-two years ago, and it looks as if it were good for half a century more.

State College Students at Work Gathering Tomatoes.
See Address of Prof. R. L. Watts.

A Member.—How do you get up to the trees?

Mr. Powell.—We do not cultivate up to the trunks of the trees; it is not necessary. The roots next to the body of a tree are composed largely of brace roots. The feeding roots are out at the extremities, and there is where the cultivation is done.

A Member.—How do you cultivate it in the spring?

Mr. Powell.—We plow as close as we can; then put in the disks, and then we use the harrows, getting under the branches far enough.

A Member.—Don't the plow tear up a great many of the small roots?

Mr. Powell.—No, we have no trouble about that. They should be cut off if they don't know enough to keep out of the way. The fact is where you cultivate, the roots keep down out of the way. If you do not cultivate they will come to the surface.

A Member.—But don't they have a tendency to come to the surface, and cutting them do more harm than good?

Mr. Powell.—No, that is not the case. If they come up they should be cut off. They will go down always under regular cultivation.

A Member.—Is your ground fairly level?

Mr. Powell.—No; our land is fairly rolling, much the same as your land here. My ground is of the gravel loam type; we aim to keep it covered in the winter with a crop of clover or rye.

A Member.—Would a little root pruning hurt the tree?

Mr. Powell.—No; in fact, if you do a little root pruning with this intensive cultivation, it helps to keep the tree from running up too high.

Prof. Surface.—How about oats for a winter cover?

Mr. Powell.—They are all right; anything that will help the soil is all right. They will freeze down, but their roots will hold the soil. Rye is better.

A Member.—You spoke of top-working your trees?

Mr. Powell.—They are left in the nursery row for two years, top-worked and then set out.

Now a little more about this cultivation. I know of no orchard implements especially adapted to our Eastern conditions. They have them for the West, where they have the fine alluvial soil, but here in the East we have a different type of soil and I have been trying to get the manufacturers to put out a different implement—an extension plow, with a beam say fourteen to fifteen feet in length and on this put two or three small gang-plows—something that would cut in the centre of the spaces and partly under the branches. They have already something of this sort in Iowa, and I hope to give it a trial this spring. We don't want to cut a furrow with it; we only want to break up the soil so as to give it light surface cultivation.

A Member.—Is that the riding harrow?

Mr. Powell.—Yes, it has a seat for the driver.

A Member.—As I understand it, this is about 28" high; that would be too high for our trees.

Mr. Powell.—No; this is only about 16" high, and the plows are on the ends, and the wheels are inside near the center.

A Member.—Do you allow your trees to hang on the ground?

Mr. Powell.—That is an important question. I begin pruning for upward tendency to the lower branches. We have trees that are now nine years old pruned in this way, and they do not get on the ground. Trees that are pruned to spread out laterally will go down on the ground. The lower branches must have some pruning on the under side only and on ends when young; this will make strong branches near the body and hold up the branches.

A Member.—Will such a tree break?

Mr. Powell.—No, I think the lateral branches are apt to break. In my own experiments I began pruning on the under side, and I have branches today on trees eight and nine years old, as big as my arm, that do not break as the ordinary trees do, with the branches running out laterally. I wish you could see this pruning. Prof. Hederick of the Geneva Experiment Station says he thinks this the best pruning he has seen.

A Member.—Then you prune back?

Mr. Powell.—I have 108 trees to the acre, so I have to prune back. Of course, this is on the filler system, and when the time comes, they will have to come out. They may run ten to fifteen years on this system of filler planting.

There is one other point. We have overlooked the birds. They are our greatest friends, and I desire to show you the importance of protecting them. Take the family of wrens. I wish those of you who still have the wrens about your houses to raise their hands. I am glad to see so many. That means that you are way ahead of us in New York. I believe it is due to your very intelligent legislation that you still have so many wrens left. On Long Island there is an enormous cauliflower industry, and yet they have a great deal of trouble with the cabbage worm. One family of wrens around the place and in the garden, will keep one quarter of an acre of cauliflower absolutely clean of the cabbage worm. Now can you see how those birds help us.. Protection to the birds is one of the great forces that we must co-operate with if we want to make our orchards more productive.

Then there is another friend—the toad. He comes out at night, and he is a good scavenger, and helps to keep the place clean of destructive insects. If he sees one he will follow it until he gets it.

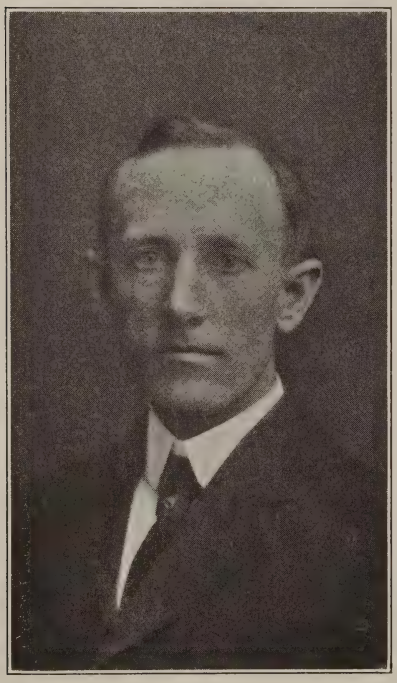
In France they understand the value of this so well that they have resorted to toad farming. Parisian farmers go into the market

and buy them at 25 cents a box and put them into their gardens to keep down injurious insects. A scientific man in Boston has been making an investigation of the toad in connection with the Gypsy moth and the Brown-tail Moth. He found that the toads came out from under his porch every night and would sit under the arc light and catch the moths as they fell. He dissected one of them and found he had filled his stomach with moths four times in twelve hours. Now, there are thousands of people in New York and other large cities who don't fill their stomachs once in twenty-four hours.

PENNSYLVANIA HORTICULTURE.*

By Prof. R. L. Watts, *State College, Pa.*

The following is a brief outline of the lecture delivered on this subject with views which were secured by the speaker as he had opportunity.



Pennsylvania horticulture may be best shown by contrasting with operations along horticultural lines in other states. Our state occupies a prominent place in practically all of the varied lines of commercial horticulture. Immense green houses have been built in recent years and the growing of vegetables as well as flowers is conducted on a much larger scale than a few years ago. The fruit industry has received a wonderful impetus during the past three or four years. Large areas are being planted to apples, peaches, plums and other fruits and there is every reason to believe that the development will be even greater. The pictures which you will see to-night will show that we are not behind other regions which are well known for their aggressiveness.

Starting in Ohio, we first want to give you some idea of the extensive work done in the greenhouses and gardens of M. L. Ruetenik. On this farm we find about two and three-fourths acres of glass devoted to the growing of lettuce, tomatoes and cucumbers.

*This lecture was fully illustrated with lantern slides and was largely descriptive of the illustrations. In preparing for printing, little more than an outline could be given.

The houses are large and provided with the Skinner system of irrigation so that the cost of operation has been reduced to a minimum. This overhead system of watering has also been installed for most of the work out of doors. It has revolutionized the work on this farm of eighteen acres where intensive methods have been used for many years. Manure is employed most freely. It is customary to apply horse manure from the livery stables at the rate of fifty tons per acre annually, both in the open and under glass. With such liberal application the returns have been large and satisfactory.

One of the best crops on the Ruetenik place is celery. The crop is grown on a large scale for marketing from late July until Christmas. All of the plants are started under glass, spraying at short intervals to control blight. For the early crop, plants are set in the open ground after danger of hard frosts. As soon as possible after planting, fresh manure from the livery stables is applied as a mulch between the rows at the rate indicated. It is customary to allow the manure to remain in small piles for a few days before applying. When used at the rate of fifty tons per acre the mulch is about five inches deep mid-way between the rows, sloping gradually to the plants. This mulch conserves moisture in the most effective way and also furnishes a liberal supply of plant food when the water is applied by means of the above ground system. This plan of culture has been signally successfully both with the early and late crop and it has been rapidly extended in the Cleveland district as well as in other parts of the United States.

Long Island has long been known as one of the most intensive market gardening sections of the United States. One eight-acre garden near Brooklyn gives steady employment during the summer to thirteen men. The most largely grown crops in this garden are beets, lettuce, radishes, carrots and other crops which may be planted close together. Ordinarily the rows of crops which are worked with wheel hoes are not more than ten inches apart. On most farms, however, twelve inches are allowed between rows. In the intensive gardens it is quite customary to start a second crop before the first crop has been removed. Manure is used with the greatest freedom and thorough tillage is given throughout the season. At the east end of Long Island is located Mr. L. H. Halleck, who is one of the most intensive market gardeners on the island. He cultivates 80 acres of land and gives employment to 40 or more men. The men are cared for in neat colony houses, coming together for their meals in a central boarding house which is managed by Mr. Hallock. There are few establishments in the country which are handled as skillfully as that of Mr. Hallock. Fertilizers and manures are used extensively on the Hallock farm. All supplies are brought to the farm by steam boats operated by Mr. Hallock and all vegetables are taken to market by means of the same boats. A full line of market gardening crops are grown at this place.

There are many operations about Boston to interest horticulturists. The work in New England is intensive and there are many

skillful growers. Manure is used with freedom and many growers also resort to the use of commercial fertilizers. A general line of garden crops are produced for the Boston market. The greenhouse industry is especially large near Boston. Lettuce, tomatoes and cucumbers are the most important crops. Probably no city in the United States grows more cucumbers than Boston. Nearly all of the greenhouses are 40 feet wide, of the three-fourths span of construction and many of them several hundred feet long. Cucumbers are also grown extensively as an early summer crop in cold frames as shown in the accompanying picture.

One of the most important trucking centers of the East is Sweedesboro, N. J.. Immense quantities of early tomatoes and sweet potatoes are shipped from this station. At Glassboro, N. J., are located the extensive orchards of Mr. Albert T. Repp. Four hundred and fifty acres are devoted to apples, pears, peaches and

Cucumber Frames in the Gardens of W. H. Allen, Arlington, Mass.

grapes. The apple is the leading fruit in these orchards. Winesap has been most largely planted. The trees are pruned very lightly until they come into bearing. All of the spraying is done with gasolene engines. Ever since the appearance of San Jose scale in the Repp orchards, crude oil has been used with entire success in combatting it. Practically no trees have been lost from the effect of the scale or from injury of the oil. The secret of success of applying oil on Mr. Repp's trees is to put it on as finely as possible. It is applied in a very fine mist so that no large amount is permitted to collect in any one place. The spray is so exceedingly fine that two gallons of oil is sufficient to spray a tree that is twenty-five years old. Mr. Repp has his own storage house which is large enough to hold 10,000 barrels of fruit. The apples are placed in five-eighths bushel hampers in the field and covered with paper and placed at

once in storage. As a rule the apples are in cold storage an hour or less after picking. They are graded and repacked when shipped. Ordinarily the apples are held in storage until May or June.

The Patapsco Neck, near Baltimore, has long been known as one of the most important gardening regions in the United States. The fertility is maintained by manure which is taken to the farm on barges, and the use of commercial fertilizer. Cabbage and spinach are perhaps the two most important crops grown near Baltimore, although a large variety of vegetables are produced for Baltimore and northern cities.

The most important trucking district of the United States is at Norfolk. A visit to this district is necessary to gain a proper conception of the magnitude in which trucking is conducted in this region. Tomatoes, spinach, beans, peas, cucumbers and many

Packing Fine Adams County Apples.
(Mammoth Black Twig.)

other crops are grown by thousands of acres and by as intensive methods as is possible in truck farming. Fertilizers have been used with the greatest freedom in this community. It is not uncommon for a grower to apply one and one-half tons per acre each season. Some of the growers are free to admit that fertilizers have been used too freely, or rather that green crops have not been grown as largely as possible to keep the soil in the proper condition. The growers in this region have begun to use lime because they find it is necessary to reduce soil acidity. The use of lime has been the means of sweetening the soil and rendering it more useful to possibly all the crops grown in that region. The Norfolk Truck Ex-

periment Station, of which Professor T. C. Johnson is director, has been exceedingly valuable in helping to solve the problems of the hundreds of producers in this locality. A number of frame growers operating near Norfolk have been realizing good profits. These men start and mature practically all their crops as beets, spinach, lettuce and cucumbers in frames. Overhead irrigation has been a great advantage on one of the places which has met with great success.

Leaving the South and coming back to Pennsylvania it is a pleasure to show a number of pictures of the splendid orchards in Adams county. This region is not only well known to the horticulturists of this state but it is known in many parts of the United States as a region which has been remarkably successful in the production of apples. Most of the pictures illustrate the spreading or open-head method of pruning or training. As is well known, York Imperial is the leading variety. Probably nine-tenths of the bearing trees in this county are of this variety. In most recent plantations, Stayman Winesap has been planted to a considerable extent and is doing well. Grimes Golden, Jonathan, Rome Beauty and a few summer varieties have been planted to some extent in the young orchards.

Kennett Square has long been known as one of the most prominent mushroom sections in the United States. Most of the mushrooms are grown in inexpensive houses, although a few more costly establishments have been built and have met with success. Mr. H. K. Hicks has, for example, erected a mammoth building with a double cellar in which he has been meeting with entire success. The greenhouse industry is also a paying proposition. Not only are roses, carnations and other flowers grown, but tomatoes are grown extensively for the Philadelphia market.

The last census report shows that Philadelphia County is fourth in the United States so far as yields and returns per acre are concerned. Some of the best and most intensive market gardening as well as truck farming may be found both north and south of the city. The farm of Thomas Brooks, Jr., is especially notable as being conducted in a thoroughly up-to-date manner. Practically no weeds can be found on this farm at any season of the year. The crops follow each other in quick succession and companion cropping is largely practiced on this farm. Stable manures are relied upon mainly for the supply of plant food. They are composted before using and then applied in large amounts. A great variety of crops, such as rhubarb, carrots, onions, celery, tomatoes, cabbage, lettuce, etc., are grown north of the city. South of the city the places are restricted mainly to crops that may be planted close together, permitting the use of intensive methods.

One of the best examples of intensive gardening may be found in Lancaster city. Ritchie Brothers have been cultivating vacant lots and meeting with entire success. Rotten manures are used more freely, perhaps, than in any other garden of the State and

sprinkling devices are also employed to control soil moisture conditions. Intercropping and succession cropping are used to a great extent.

Skinner System With Celery on the Farm of Robert J. Walton.
Young Orchard in the Background.

One of the notable establishments near Harrisburg is that of Mr. Robert J. Walton, of Hummelstown. Fruit growing and market gardening on a considerable scale are carried on here and a thoroughly equipped and very satisfactory Skinner system is in operation.

Most of our horticulturists are familiar with the grape industry of Erie county. Hundreds of vineyards near Northeast have been returning to the owners satisfactory profits. Probably 95 per cent. of the plantings in this region are of Concord.

Many of the market gardeners and truck farmers which we have met during the past few years grow a large percentage of their own seed.This tendency is on the increase, not because dealers are selling poorer seed than formerly but because growers realize more fully the importance of growing and using the best seed. Some of the most successful growers in the United States have become plant breeders in a practical way, their seeds being produced by dealers who recognize the importance of furnishing their patrons with the very best seed. I regret that it has been impossible to show more views illustrating horticultural operations in different parts of Pennsylvania.

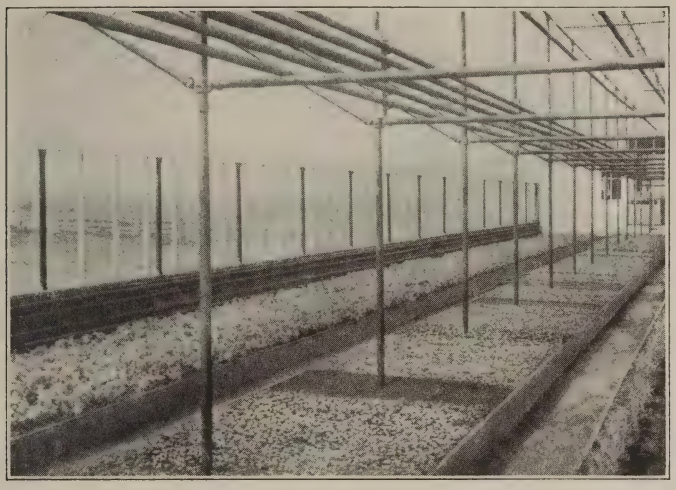
I am certain there are many people here to-night who are interested in the work of the Department of Horticulture at the Pennsylvania State College. Experiments are being conducted along various lines. In vegetable gardening, cabbage, tomatoes and asparagus are receiving the most attention. The aim of the Department

is to make a most thorough study of the most important questions relating to the culture of these three crops. All of these vegetables are of the greatest commercial importance to Pennsylvania. The strain tests with cabbage and tomatoes have been particularly valuable. The results indicate great variation in strains of the leading varieties of cabbage and tomatoes. In Early Jersey Wakefield for example, some strains have cut about $100 more per acre than others. There have been marked differences in types and yields. An acre of experimental asparagus is giving most excellent results. Measurements and weighing show that it is exceedingly important for commercial growers to plant large crowns of plants rather than small ones. Palmetto seems to be the best variety to plant because of its power to resist disease and its vigor and productiveness.

Retail Market Wagon of Robert J. Walton, Hummelstown, Pa., Showing an Inexpensive Shed for the Mixing of Spray Materials.

The entire field of horticulture is covered by the various courses of study which are offered by the college. Most of the subjects are taught by lecture with accompanying laboratory exercises. Responsibility is placed upon the students as much as possible so that they will develop self reliance and attain the greatest possible efficiency in the management of crops under glass as well as in the open. In greenhouse work, for example, each student is assigned given areas on which he grows lettuce, tomatoes, cucumbers or perhaps flowers. He is held absolutely responsible for the plot, giving the care that may be required from day to day. On the college farm he is also assigned areas for garden work for which the student makes plans and then carries out his plans. In plant propagation the students are taught budding and grafting in a practical way. The root-grafts, for example are tied together in bunches with the student's name attached and he afterwards plants them in the nursery on the college farm. There are three distinct values to be

gained in conducting laboratory work in this manner. First, it creates enthusiasm. Second, it develops self reliance. Third, it gives the student an opportunity to become familar with the practical operations in market gardening, vegetable forcing, floriculture and orchard management.



One of the Greenhouses at State College, Showing the Student Plots.

WEDNESDAY, JANUARY 25, 9 A. M.

President Heister in the Chair.

VEGETABLE FORCING UNDER GLASS.

By C. W. Waid, *New Carlisle, Ohio.*

Ladies and Gentlemen: Indeed, it gives me great pleasure to meet with you for the first time. Most of you are strangers to me, but I feel at home in spite of that fact, for two reasons, at least. In the first place, my father was born in this State, and in the second place, in meeting with the horticulturists in different parts of the country, we find that the problems they are trying to solve are the same, and it is easy to make friends if you are looking for them.

I find with you, as with us, that the subject of apples is most prominent, and probably to most of you, of the most interest. You have with you one of our most expert growers in Ohio, Mr. Farnsworth. He is a man whom we in Ohio, consider an authority because of the able way in which he produces a first-class fruit. You can bank on what he says being backed up by experience and success. I, myself, have eighty acres of orchard started, but not in

bearing as yet. But there are other products in the Horticultural line besides the growing of apples, and since coming here, I have learned that you are producing along the lines about which I am to speak to you, but I doubt wether most of you realize this opportunity as you should.

You talk about the Western man coming into the Eastern market and selling his apples. Do you know what the greenhouse men are doing to-day? Men in Massachusetts and in Ohio and in New Jersey are buying your coal and your glass and sending the lettuce back to your people and selling it, and making money on it, too, and good money at that. Is there no opportunity here for you? There are a good many in the business, but not nearly so many as could profitably engage in it, and I hope if you are not already interested, you will consider the subject with me this morning and become interested. I am confident that many of the young men under Professor Watts will take up this work and make a success of it, and vegetable forcing under glass will be one of the lines.

When I accepted the invitation of your Secretary to talk to you on this occasion, I told him that I make no pretense to being a public speaker. Unlike most of those who have preceded me, I am seldom able to get away for even this length of time, as our work is very confining. I realize that looking after the details of the business is where success usually comes. I will now take up my subject, and if there are any questions that I can answer, I shall be pleased to do so.

No doubt most of you are aware that vegetable forcing in Ohio has attained very large proportions during recent years. The places at which the greatest development has occurred are Ashtabula, Toledo and Cleveland. All located in the northern part of the state and not far removed from the lake. Besides the development at the places named, small or medium-sized plants have been built near or within easy shipping distances of most of the larger cities throughout the state. It would seem safe to say that at least one half of the present area of glass in Ohio has been built within the last ten years.

At Ashtabula there are less than a dozen plants all located within a mile of each other. These sets of houses cover over twenty acres of ground. At Toledo there are about one half dozen large plants and a large number of small greenhouses. The total area covered by glass and devoted to vegetables is probably somewhat greater than that at Ashtabula. The largest plant in the state is that owned and operated by the Searles Brothers, at Toledo, and consists of a set of old houses covering three acres and a new plant which was planned to cover ten acres, two acres of which is yet to be built. This eight-acre greenhouse plant is all under one roof. The service room alone would be considered a good-sized greenhouse by many growers.

At Cleveland there are a very large number of houses, many of which covers one-fourth acre or more. Mr. M. L. Ruetenik's plant which covers about three acres is the largest. The total area would probably not be over one-half that at Toledo. There are only a

few small greenhouses in or near Cincinnati. This is probably due to the fact that growers there have depended on hot beds and cold frames and have not as yet become much interested in the construction of greenhouses.

Style of Houses.

The style of houses in use varies considerably although the narrow span is most popular. Most of the large plants at Toledo and Ashtabula are made up of sets of narrow span houses, the width being about 15 feet and the length varying from 100 to 750 feet. The Crane Bros. of Toledo have both narrow and wide houses. The wide houses are 45 to 50 feet in width and about 350 feet in length. They are individual houses, having been built separately and are giving satisfaction. This style of houses has a decided advantage over the connected houses in a section where the snowfall is heavy. It takes a comparatively short time for the snow to slide off of a roof which has no gutter while a much longer time is required to melt the snow out of gutters of connected houses. Our own houses are 32 by 200 feet and connected. We find that the snow clears from the outside slopes much quicker than from the inside.

So far as results are concerned we find good crops growing in narrow and wide houses, connected and disconnected houses, in houses running north and south and east and west. It would seem from this that the style of house has little to do with the quality of the crop grown. This is assuming that all of the construction is good. Light, clean houses are always superior to dark, dirty houses. The style of house which we select will depend on our own individual preference, the comparative cost and apparent durability. We usually find more or less similarity in construction in each community. This shows the tendency to "Go and do—likewise."

It is the opinion of the writer, although I must admit that I have no data to support my statement, that wide houses can be heated more economically than narrow houses. It would also seem that when tender crops such as cucumbers and tomatoes are grown in midwinter that the danger from draughts would be much less in wide than in narrow houses.

Heating.

At Ashtabula and Cleveland nearly all of the houses are heated by steam. At Toledo hot water is the popular method of heating. Anyone who thinks hot water not practicable for large plants should visit Searles Brothers' eight acre plant. The water is pumped through the system. The heating pipes as I remember are all 1¼ inch pipes. They are run in sets near the surface of the ground, one set under each gutter. The houses are 750 feet long and the heating pipes half that length. In our own houses in which there are 20,000 sq. feet of glass we heat with hot water. The boiler is a Kroeschell with a mercury generator attached. The heating pipes

are two-inch, one flow and two return in each set. For houses the size of ours or smaller there is no doubt but that hot water is the most economical method of heating. It would take a careful set of experiments conducted over a long period of time to determine whether steam or hot water is most economical for large plants.

Glazing.

The most popular size of glass is the 16 by 24 double strength A. glass. B. glass is used in a few instances and a very few growers use single strength. In most cases the 16 by 24 glass is laid the 16 inch way. The glass on our own houses is laid the 24 inch way. This gives a very light house and has been quite satisfactory. Once last winter when we had an unusually heavy snow and drifts formed to a depth of from 3 to 4 feet in the gutters, several glasses were cracked. It would seem from this experience that it would not be wise to space the glass the wide way in a section of the country where heavy snows are common. If the glass is spaced the 24 inch way it is advisable to have some glass, either in the sides of the house or in the roof of a small house spaced the narrow way. This should be done so that use can be made of the panes of glass from which small corners are broken.

There is quite a difference of opinion as to whether butted or lapped glass is to be preferred. As a general thing there is less drip from lapped than from butted glass. On the other hand butted glass is more secure than lapped as the lap holds it in place. Butted glass is usually easier to keep in repair than lapped.

Soil and Soil Treatment.

The soil at Ashtabula is very sandy while that at Cleveland and Toledo is a sandy loam. It might seem from this that sand is necessary in the vegetable forcing business. This is not the case, however, as it has been demonstrated by the Experiment Station and several growers throughout the state that heavy soils will give results equal to sandy soils. In any case large amounts of organic matter should be added to the soil. I would as soon have clay loam as sand for the basis of the soil for forcing. The soil in our greenhouses was made up of two parts clay loam, which contained a fair amount of organic matter and available plant food, one part muck and one part stable manure. It will be necessary, no doubt, to add more muck from time to time in order to keep the soil mellow and in a good physical condition.

It is only in rare instances that soils are renewed in vegetable forcing houses. Several years ago I saw a crop of lettuce growing in soil which had been in continuous use for thirty years and the crop I saw was a very good one. So far as I know this soil is still in the houses. In most cases the greenhouse soil is kept in a productive state by the addition of large quantities of well rotted stable manure which is spaded into the soil just previous to the planting of each crop. The Ohio Experiment Station and a few growers in

the state have for several years followed another plan of renewing the soil fertility. Briefly the plan is as follows: As soon as the tomato or cucumber vines are removed from the houses, about August fifteenth, a heavy coat of manure is spread upon the soil. Water is applied at frequent intervals, once or twice a week, and in sufficient quantity to leach the fertility out of the manure into the soil. Just before the first crop is planted the coarser part of the manure is removed and the finer worked into the soil. No more manure is added to the soil until the tomato or cucumber crop is to occupy the ground when well rotted manure is worked into the soil or coarser manure applied as a mulch. Thus two or three crops of lettuce are grown with but one application of manure. This is the plan we follow and we have found it very satisfactory.

As a general thing little or no commercial fertilizer is used in vegetable forcing houses. Tests which were conducted by the Ohio Station demonstrated that commercial fertilizers can be used to supply the plant food in greenhouse soils but it is necessary to supplement them with some form of organic matter. Manure or muck being suitable for this purpose. When stable manure which has not been exposed to the weather can be secured in sufficient quantity without too great an outlay there is little use made of commercial fertilizers for greenhouse work. There is need, however, of further investigation by our Experiment Stations and others to determine when and in what quantities commercial fertilizers can be used to advantage in vegetable forcing houses.

Lime has been used with good results in some cases. We save all of the ashes which result from the burning of the tobacco stems and work them into the soil.

Soil sterilization has been found necessary in many of the commercial houses. Steam has given best results although formalin has been used successfully in some cases. The outfit for sterilizing with steam should consist of a steam boiler with connections to perforated pipes buried in the soil to be treated. The soil is not moved from the beds or benches but treated where it is in use. The steam is forced into the pipes under pressure and the pipes are not removed or moved until the soil is literally cooked. Where subirrigation is used the steam is turned into the tile for sterilizing the soil. Some of the Ashtabula growers use muck in which to start the seedling plants. The muck is placed in a box through which perforated pipes are run, the steam turned on and the soil sterilized before it is used. This treatment kills all disease germs and weed seeds and thus renders it ideal for a plant bed. On heavy soils it is necessary to allow the soil to stand untouched at least one week and two weeks is better after sterilizing, before any planting is done.

To sterilize with formalin use 1½ to 2 quarts of formaldehyde to fifty gallons of water applying one gallon of the solution to each square foot of surface. This solution may be applied through the overhead watering system if such a system is in use. Formalin has given fairly good results as a means of overcoming the disease known as Lettuce Rozette but is not effective in controlling lettuce rot.

Intensive Methods in New Carlisle, Ohio Greenhouses—Three Crops of Lettuce in One Bed.

Crops Grown.

The general practice in Ohio is to grow three crops of lettuce followed by one of cucumbers or tomatoes. This is varied somewhat by different growers and different years. Tomatoes are grown as a fall crop in a few cases. A very few growers force cucumbers in the fall. Radishes, beans, cauliflower, beets, parsley, etc. are all grown more or less. In a few instances chrysanthemums are forced instead of lettuce in the fall.

Lettuce.

Grand Rapids lettuce is grown almost exclusively in Ohio. One of the difficulties which confronts the grower right at the start is that pure seed is hard to get at any price. I have yet to see a crop grown from seed purchased from a seedhouse that did not show some tendency to revert to the coarse dark colored type. The Ohio Station has secured seed by selection which is very nearly pure. This shows that it is possible to produce pure seeds and the growers should let the seedsmen know that they want pure seed and are willing to pay for it. It is not necessary, however, to depend on the seedsmen for lettuce seed as it can be grown quite easily and the greenhouse who secures satisfactory strain by purchase or by selection should grow his own seed.

At Ashtabula the seeds are sown in solid beds which have been covered to a depth of four to six inches with sterilized muck. The seeds are covered with moist brown paper. As soon as the plants are large enough to handle they are pricked out in other muck

filled beds being spaced about two inches apart each way. The root development of the plants in this soil is remarkable. The plants are allowed to grow to a height of three or four inches when they are removed and transplanted in the permanent beds.

The Toledo growers use flats in which to sow the seed and grow the young plants. These flats are about one and one-half by two feet in size and the bottoms are made of closely woven galvanized wire. One of the chief advantages of the flat method over the ground bed is that the flats may be carried to where the planting is done and the plants removed and set with much more dirt in contact with the roots than is usually the case where the plants are removed from the beds, carried some distance and handled a second time before they are set. There is however, a large amount of work connected with the handling of the flats which offsets much of the gain. Another advantage of the flats is that the roots are more or less confined, the soil being shallow in the flats, and thus overgrown plants are less frequent with flat grown than with bench grown plants. If it were possible to set the plants every time just as soon as they were large enough this advantage would be slight but it is frequently necessary to hold them several days after they are of sufficient size and the flat grown plants can be held with less danger of injury than those grown in beds. The Toledo growers do not let their plants grow as large as the Ashtabula growers before setting in the permanent beds.

In our own houses we start the lettuce in flats and make one transplanting into flats. The first crop is not transplanted but once until it is transplanted from the flats to the beds. For the second and third crops the seed is sown in flats, the seedlings pricked out in flats and as soon as crowding begins the plants are transplanted into two-inch pots or into flats and given more room. When the pots are used they are plunged into the soil between the rows of lettuce, twice as many pots as there are plants in a row. In this way we are able to secure very stocky plants which when planted by the side of those which have not been transplanted the second time show a gain of two or three weeks over the smaller plants. This gain in time we think justifies the extra work involved. By setting the pots between the plants in the beds we have two crops growing on the same ground at one time and thus economize room. When the plants are plunged in the sub-irrigated beds we give the soil a thorough watering as soon as the pots are in place and little or no further watering is needed as a sufficient amount of moisture is drawn into the pots from below. The same is true of the beds watered with the Skinner system. I would not recommend this practice, however, where the watering is done with a hose in the old fashion way.

When the plants are set in the permanent beds they are spaced 7 by 7 inches which we think a very satisfactory distance. The soil between the plants is stirred once or twice with hand weeders. This is done to kill weeds and to prevent the formation of a crust on the surface of the soil. If the green aphis is troublesome we scatter tobacco dust over the surface of the soil just before the leaves

spread enough to cover the ground. Much care is taken in distributing it not to get the dust on the lettuce leaves as it is very hard to wash off after it has been on the leaves for some time. It is also a good plan to work some of the dust into the surface of the soil before planting.

Most growers aim to keep a night temperature of 45 degrees with a day temperature at least 10 degrees higher. We aim to run the temperature somewhat higher than this at night, 48 to 50 being what I consider about right. On cloudy days we do not try to run the temperature above 60 and 55 degrees is satisfactory. When the sun shines the temperature often runs very much above this but no harm will result if the ventilators are opened wide. Ventilating the houses is one of the most important operations connected with greenhouse work and I might add that it is the one most commonly neglected. Our houses are provided with ventilators on both sides of the ridge and on the sides and we make use of all of them. It is only on very cold, zero or below, weather or snowy days that we keep the ventilators closed in the day time. When the nights are warm we leave them up an inch or so all night. If I were to give the cheapest and surest way to prevent lettuce rot in the greenhouse I would say use elbow grease on the ventilators.

Packing and Marketing Lettuce.

The Ashtabula growers pack all of their lettuce in splint baskets, four pounds to a basket. The Cleveland growers sell in the local market and pack in bushel crates. The Toledo growers pack in large sized barrels. We are able to procure barrels at a low cost and as our market is close we can pack in barrels and place on the market in good condition. We ship by traction and sell through commission men. If we were to sell to grocerymen direct we would pack in a five or ten pound box or basket.

The important thing in packing is to put in nothing but clean marketable lettuce and have it alike throughout the package. Do not leave long stems, dead or rotten leaves on the plants.

The Ashtabula growers are most of them organized into an Association, called "The Ashtabula Lettuce Growers' Association." Mr. E. A. Dunbar is General Sales Manager and looks after the selling of the combined produce of the members of the Association. This does away with the competition and resulting cutting of prices among the growers themselves which I have been informed was quite common before the organization was formed. It also enables the growers to give more time to the growing of their crops as they do not need to devote any time to the selling of them.

Growers who are located near a good market have a decided advantage over those who ship long distances. They are able to place the lettuce on the market in a fresher condition and thus can get one or two cents more per pound for it. They are not compelled to pay as much expressage and are often able to cut out one or more middlemen.

Cucumbers.

At least 75 per cent. of the total area of glass for vegetable forcing in Ohio is devoted to cucumbers in the spring and early summer. The White Spine is grown more than any other kind. Seeds are planted in pots or in solid beds about four weeks before the plants are to be set in the permanent beds. The time of setting varies with different growers and different seasons and extends from March first to the middle of April. Cucumbers are more particular than lettuce as to treatment and must be handled with much more care. The temperature should not be allowed to go below 65 and 70 is better. Daily ventilation should be given but cold draughts should be avoided. When started in pots care should be taken not to overwater, on the other hand the plants should not suffer for lack of water. Cucumbers should be given all of the room in the beds as the plants grow so fast that other crops do not have time to mature before the cucumbers occupy the space. Seedling plants grown in flats may be placed between the cucumber hills for a short time but should not be left too long.

The soil for cucumbers should be supplied with an abundance of available plant food either by applying manure to the soil or by mulching after the cucumbers are set. The spacing of the plants varies more for cucumbers than for any other greenhouse crop. When the inverted V shaped trellis is used upon which to train the vines the rows are set from eight to sixteen feet apart, and in a few cases even wider, and the plants from 6 to 18 inches apart in the rows. When the vines are trained upright the plants are set from two to three feet apart each way. When the vines are trained on an inclined or V shaped trellis the cucumbers hang below and are easy to gather. The chief objection to this form of training is the unequal distribution of the roots in the soil. Our practice is to set the plants two feet apart each way, one plant in a place, and train the vines straight up. This gives a very even distribution of foliage and roots as well. While I have only meager data at hand, some tests made at the Ohio Station a few years ago indicated that the largest yield per square foot is secured when the cucumbers are planted two by two feet rather than much wider apart one way and closer the other.

Nearly all growers practice removing all laterals or side runners. Some cut them off next to the main vine while others clip them just beyond the first female blossom. The last method gives the most fruits in my judgment. Bees are nearly always kept in the houses during blooming time to assist in the pollinating of the flowers.

As soon as the cucumbers are large enough, picking begins. After the first week or two we pick three times a week. The cucumbers are graded into first, seconds and culls. The second grade runs smaller than the first but the specimens must be of good color and not too irregular. No effort is made to sell the culls.

The Ashtabula, Cleveland and Toledo growers use the same package for cucumbers that they do for lettuce. We have found

Manure is Used Extensively in North Philadelphia.
See Address of Prof. R. L. Watts.

the 24-quart berry crates a very satisfactory package to ship in. They must be nailed securely and the slats removed from the tops. Some of the Toledo growers turn the hose on the cucumbers after they are in the barrels. We have always avoided wetting them using a cloth or gloves to clean when sandy or in need of cleaning.

Cucumbers have the advantage over tomatoes of coming into bearing earlier or sooner after they are set in the beds. There is usually less work connected with the growing of cucumbers than tomatoes but the tomato crop is surer. The comparative net profits depends on the prices at which both crops sell.

Tomatoes.

As I am scheduled to treat the subject of tomatoes this P. M. I will only refer to this important greenhouse crop in a general way at this time. The tomato is a very satisfactory crop to force in greenhouses for spring and early summer markets. The quality of greenhouse tomatoes is so superior to anything on the market early in the season that when the trade has once learned to know the difference the demand is nearly always good. The crop is dependable, also, thus serious loss is seldom experienced.

Radishes.

It is only occasionally that radishes are forced as they are generally considered less profitable than lettuce. We grew radishes the last two seasons and while the returns were not as good as from lettuce at good prices yet they were better than from lettuce at low prices. One crop gave a net return of 8½ cents per square foot

which is about the same as 8 cents per pound for lettuce. Our method of growing them was different from that usually followed. Instead of thinning the plants so that each radish would have plenty of room to develop we left the plant quite thick in the rows, from one-half to three-fourths of an inch apart. As soon as a few of the radishes were large enough for market they were pulled and this answered the purpose of thinning. In a few days another pulling was made and so on until all had developed and were pulled. This gave us a much larger yield per square foot than we could have secured any other way although the time required to grow the crop was somewhat longer than it would have been if the plants had been thinned out more at the start. The varieties used were Fireball and Scarlet Globe. We also grew some Icycle but they will not stand crowding as well as the button varieties.

An oversupply of lettuce is not an uncommon thing in the early fall. In order to avoid this it is well to devote some of the space to other crops at that time of the year. Radishes, string beans, cauliflower and beets are all suited to this purpose.

The writer does not know how well the markets are supplied with greenhouse products in your state, but if there are any cities of 10,000 or more population which are not supplied locally with these crops each one is offering someone an opportunity to make a good living. No one should start in the greenhouse business, however, on a large scale without having had some previous experience along that line. Vegetable forcing under glass is most exacting and requires the closest attention to details of any form of gardening. On the other hand there are few lines of work which will show the effects of a master hand more quickly and fully or give more genuine satisfaction to the man who likes that kind of work than vegetable forcing under glass.

The President.—The speaker will be at your service now, to answer any questions you may want to ask.

A Member.—Is the dry manure preferable to the fresh stable manure?

Mr. Waid.—It is hard to get fresh stable manure.

The President.—Is it as readily available as the dry?

Mr. Waid.—There is a large amount of available plant food in it, sufficient, I think, to supply the needs of the plant, but not as much as in dry manure.

Prof. Watts.—Does the muck soil prove better than the sandy soil?

Mr. Waid.—I am satisfied that the plant development is better in the muck, than in the sandy soil, but I think a mixture of the sand with the muck is better.

Prof. Watts.—Are the advantages sufficient to make it advisable to have the muck soil shipped for that purpose?

Mr. Waid.—That would depend upon the expense. I would not go to a great deal of expense.

A Member.—Are these the solid beds that we have heard about?

Mr. Waid.—Yes, sir.I do not refer to the florist's work at all.

The President.—Where muck is not available, would rotted sods take its place?

Mr. Waid.—So far as the greenhouse work is concerned, it would be all right, but I do not think it would do for vegetable forcing under glass.

The President.—What is the difference?

Mr. Waid.—It is more of a physical than a chemical difference.

A Member.—When and how often do you sterilize your soil?

Mr. Waid.—We never sterilize; we have never had occasion to, where the summer mulch has been practiced. Where we do sterilize the soil, we do it at least once a year; sometimes it is done more frequently, but at least once a year.

A Member.—When is that done, in the spring or fall?

Mr. Waid.—In the fall, between the last crops and the ones put in in the fall.

A Member.—Has there been any use of the Hydrocianic Gas fumigator?

Mr. Waid.—Not to my knowledge. It has been done in the case of the white fly.

A Member.—Have you any trouble with that?

Mr. Waid.—It is a very troublesome pest where it becomes established, in the growing of the tomato and cucumber; it does not bother the lettuce very much.

THE MUSKMELON.

By Prof. J. W. Gregg, *State College, Pa.*

Mr. President: It affords me peculiar pleasure to be present at a meeting of this Association and have the privilege of addressing you upon a subject dealing with a crop that to many minds is the garden's unequaled delicacy.

Writers tells us that the muskmelon has been grown as an article of food from a very early date, and that from the hotter parts of the Orient it has been introduced all over the world until to-day it is a favorite in many home gardens as well as of great commercial importance in many sections of this country. At the mere mention of the name we immediately think of New Jersey, the Delaware Peninsula, Maryland, Ohio and the districts around Rocky Ford, Colo. We think of these sections as affording ideal soil and climatic conditions, of their methods as the best and of their growers as thoroughly up-to-date as the light of modern science will permit. However true this may be, the fact remains that we are usually very much disappointed in the fruit from these sections as it reaches our markets and tables, and we are rapidly recognizing the high-quality of home-grown melons whenever they are to be found on our markets.

Starting Muskmelons in Hotbeds.
Courtesy of C. G. Woodbury, Lafayette, Ind.

We find that comparatively few melons are raised in Pennsylvania and that our larger markets are being supplied almost wholly by the sections previously mentioned, while merchants in many of our smaller towns and villages do not pretend to handle them at all, thereby depriving a large rural population of a most delicious and healthful food. This condition should not be so, because by continuous breeding together with the varying soil and climatic conditions of this country the melon has become adapted to a wide range of territory and is capable of being grown in larger numbers in Pennsylvania. I presume, however, that the low status of melon growing here in this state may be due to three causes, first, lack of knowledge regarding culture. Second, the tendency to late maturity, and third, improper selection of varieties. Many

have failed or obtained only partial success because the requirements of the crop have not been thoroughly understood. Soil, seed, planting, cultivating, harvesting, marketing, insect pests and diseases are all factors that spell success or failure in proportion to the amount of knowledge and proper practice of each.

It is not my purpose this morning to lay down any specific rules that will guarantee a crop of melons, but rather to consider somewhat broadly perhaps the vital points of melon growing in Pennsylvania with the hope that some suggestions may be offered that will lead to a more general production of this highly desirable article of food.

While we usually recognize a sandy loam as best adapted to melon growing, it is a fact that heavier soils containing a considerable amount of clay, if well drained, well located and supplied with humus and plant food will grow good melons. I would select if possible a piece of land that has a good slope to the South in preference to land on the lower levels, because the former is more quickly warmed up in the Spring, natural drainage of the soil is usually better and there is good air drainage. Such land should be brought into as high a state of fertility for melons as for any other crop. Soil capable of growing a good clover sod may be considered in good condition for melons in fact, it is recommended to plow down a clover sod in the fall and in the spring make an application of yard manure at the rate of 10 or 15 tons per acre. The fall plowing should be deep and the working of the soil with a disc or cutaway in the spring should be most thorough in order to completely incorporate the manure with the soil and to make the soil open, loose and fine and capable of holding large amounts of moisture for the future needs of the plants. The melon is usually considered a shallow rooted plant and for this reason soils in the past have not been worked very deep, but it has been my experience that a deeper root system is encouraged by a deeper working of the soil and this means stronger and healthier plants and a better crop in every respect. The melon plant when well grown has an extensive root system, as well as a large vine and leaf surface, and it takes a large amount of plant food to support this growth. We do not need to worry about getting the soil too rich for melons providing the plant food is well balanced. I mean by this that if clover sod is plowed down and heavy applications of manure have been made we will need to use phosphoric acid and potash in sufficient amounts to balance up the nitrogen that has been added to the soil by the clover and manure, otherwise the plants are liable to produce too much vine growth at a sacrifice of fruit. I believe many plants blight or become weak and stunted in growth late in the season because of the lack of sufficient plant food to hold the plant up during the period of fruit production. Chemical fertilizers have not been used successfully in the Colorado districts but I believe here with our heavier soils they may be used to advantage and the sources of supply for the different elements should be chosen with reference to a gradual availability in order that the plant may be kept growing throughout the season.

It is impossible to recommend a fertilizer that will suit all conditions. Each man will have to work out his own fertilizer problem and apply in amounts to suit the needs of the crop in his soil. A fertilizer that has been found satisfactory in many cases consits of four per cent. nitrogen, eight per cent. phosphoric acid and ten per cent. potash applied at the rate of 800 to 1500 pounds per acre. It has always been my practice to apply the phosphoric acid and potash and a little of the nitrogen broadcast and thoroughly work it into the soil with the harrow and save most of the nitrate of soda to be used as a top dressing to start the plants off after they have produced their first true leaves or after they have become established if transplanted from a cold frame. Some growers on a small scale especially prepare each hill using two or three forkfuls of manure in the bottom and covering with about four inches of soil in which the seed is sown, but the general practice is now to prepare all the soil evenly and thoroughly.

After the soil has been put in good condition the seed may be safely sown about the 15th of May and by the time the young plants are through the ground all danger of frost will be past and the nights will be getting warmer. I do not believe anything is gained by planting seed too early in cold, wet soil. The seed germinates slowly and the plants are often stunted by cold nights and show the effect throughout the season. There are two methods of planting with varying distances for each. Seed is often sown in hills, the common distances being six by six to facilitate cultivation in both directions. The larger growers, however, are now planting in hillrows ranging from seven to nine feet apart and sowing enough seed so the plants may be thinned to stand two or three feet apart in the row. This system requires more hand cultivation but has the advantage of allowing two rows of early peas to be grown between each row of melons before the melons need the space. Care should be taken not to plant the seeds too deep. An inch and a half is deep enough in light soils, while an inch is better with our heavier soils.

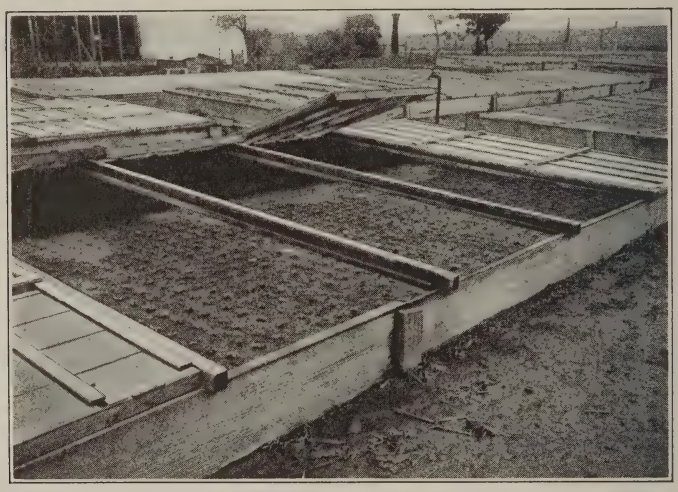
By sowing seeds in hotbeds and transplanting to the field it is possible to gain one or two weeks in the ripening season. Great care and attention is necessary, however, to grow the plants strong and healthy in the frames and in transplanting them to the open ground. The melon is a plant that does not like to have its root system disturbed and as a result, careless planting often checks the plant to such an extent that it is a fit subject for disease or insects and if it succeeds in living at all it shows the effect of the check throughout the season.

After the plants are up, or immediately after transplanting, they should receive constant cultivation to check all weeds and to conserve moisture. Shallow cultivation should be kept up until the growth of the vines prevent. Hand weeding and hoeing must often be resorted to to keep weeds from occupying the space needed by the melon vines.

After sowing the seed or transplanting the young seedlings from the hotbed to the open ground we must be prepared to fight insects and disease. The striped cucumber beetle is probably the

worst enemy of the plant during its first stages of growth. Various remedies have been used and recommended but probably the most valuable of all is Bordeaux mixture as its presence on plants is distasteful to the beetles especially if some poison like Paris Green or arsenate of lead is added. Bordeaux mixture at 4-4-50 strength with one-half pound of Paris Green or two pounds of arsenate of lead will effectively control the beetle.

The one objection to this mixture, however, seems to be that it should not be used until the plants begin to vine as it has a tendency to check the growth of young plants. Tobacco dust with powdered arsenate of lead added forms a very reliable repellant up to the time the Bordeaux can be used. It is a question with me just how many beetles die from the effect of the poison, probably a few but to my mind this mixture does more to keep them away than to kill and they are expert at dodging sprayed or dusted plants. For this reason, trap plants may be left untreated for them to fed on until this period of danger is past. Clean culture in the fall also serves to destroy winter hiding places for the beetles.



Starting Muskmelons in Hotbeds.
Courtesy of C. G. Woodbury, Lafayette, Ind.

The melon aphis is the other serious pest that must be fought. It is advisable to watch the young plants closely and pull up and burn if only a few plants are attacked. These insects are somewhat difficult to combat as they work on the under side of the leaves and must be killed by a contact spray. A ten per cent. solution of kerosene emulsion sprayed on the under side of the leaves with good force will successfully control the aphis, but the great difficulty seems to be in hitting all of them and they must be hit to be killed.

Rust is the worst fungous disease of the melon and a great deal of attention is being paid to the breeding of a rust resistant

variety. At the present time a variety known as Pollock seems to be showing up quite well along this line. All experiments, however, tend to show that this disease can be successfully controlled by spraying with Bordeaux mixture (4-4-50 or 4-5-50). The first spraying may be made as the plants begin to vine and other applications made as growth takes place in order to keep all new growth covered with the bordeaux. The rust is the worst in hot, wet seasons.

There are many varieties of melons differing in earliness, color of flesh, shape and size. The green fleshed varieties are firmer than the salmon fleshed varieties and should be grown on the warmer, lighter soils and for long distance shipping. While the orange fleshed varieties are much richer in flavor, as a rule, but become over ripe and soft, quickly when grown on light, warm soils, they are perfect melons in every respect when grown in a cool location. While it is claimed that some markets are particular in their demands for certain varieties, I find that if the flavor is present it does not matter what the size is or whether it is a green or salmon fleshed variety. Of the green fleshed varieties, Netted Gem, Long Island Beauty and Pollock, are probably the leading ones, while Emerald Gem, Hoodoo and Millers Cream lead the salmon fleshed varieties. I thank you.

Mr. Engle.—What is the difference between muskmelon and cantaloupe?

Prof. Gregg.—That is the same old question. Most of the varieties we are growing in this state are muskmelons. The cantaloupe is supposed to be more of a European product; we very seldom see the true cantatloupe grown in this country. On the old, true cantaloupe, the rind is hard and rough. They have not the appearance of our netted muskmelons, and as grown in some sections lack flavor. They are grown freely in many of the older sections of the world, but as I understand it, they are not often found in this country.

Mr. Engle.—Is the Casaba coming in from California a muskmelon or a cantaloupe?

Prof. Gregg.—It is of the cantaloupe type.

A Member.—Is it true that old seed is better than new seed?

Prof. Gregg.—I don't think so. Mr. Waid, what do you know about it?

Mr. Waid.—No, I don't think it is.

A Member.—Do you think it advisable to take a bucket with tobacco or kerosene emulsion in it, and dip the leaves and vines in it?

Prof. Gregg.—That has been done but would be slow and expensive on a large scale.

Mr. Engle.—Your method of combating the striped beetle is a surprise to me. You say nothing about covering the plant with gauze; this method is used by many of our growers here.

Prof. Gregg.—It has been done; the only objection is that it takes so much gauze, and so much time, and it does not last two years. You have to buy new material every year.

Mr. Fox.—You spoke of spraying with Bordeaux mixture; would it not be injurious to the plant to use the Bluestone as strong as 4-4?

Prof. Gregg.—Some injury has resulted in some sections, but it is a good formula.

A Member.—What causes the crackiness in the melon?

Prof. Gregg.—Too rapid growth, and sometimes too hot, rainy weather just before the period of ripening.

A Member.—Do you apply your Bordeaux for the beetle immediately after the plant comes up, or do you wait until it has got a start?

Prof. Greeg.—Sometimes the plant coming through the ground is checked by the application of Bordeaux, but I know men who begin to spray immediately after the vines come through the ground.

A Member.—My experience has been that the beele will attack the young plant and keep right on with its work.

Prof. Gregg.—Yes, that is so, and the method of keeping the stem covered by dry earth will help to prevent that.

A member.—My experience has been that using phosphoric acid, or a strong antisceptic, such as creolin or carbolic acid, will help to overcome them.

Prof. Gregg.—Yes; or a mixture of sawdust and kerosene will do. They do not like anything with a disagreeable odor, and also dislike any covering.

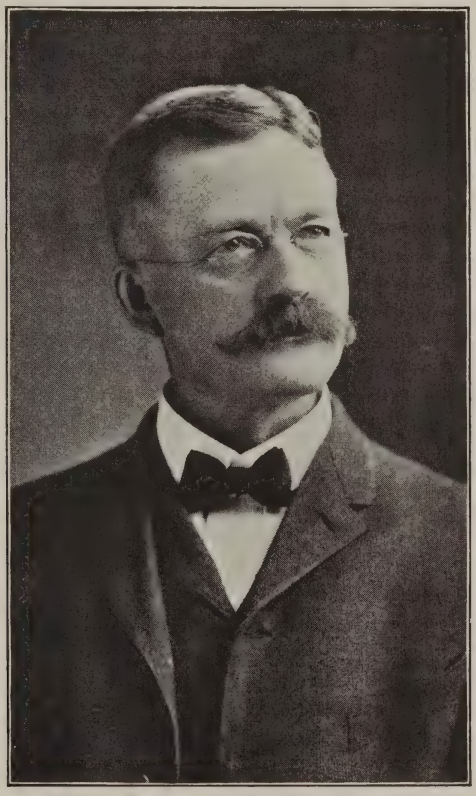
The President.—I am glad we had this subject on the program this morning, for the reason that Harrisburg pays thousands of dollars every year for muskmelons shipped in from the South and from California, when it should be paid right here. We have some of the finest melons raised right over here in York county, and there is no reason why melon growing cannot be developed into one of the most successful and profitable branches of horticulture in our state.

PEACHES.

By W. W. Farnsworth, *Waterville, Ohio.*

I am glad to be with you this morning, and bring to you the greetings of the fruit growers of the Buckeye State.

It seems that anything outside of the apple does not receive much attention. I am not jealous of the prominence of the apple; the consumer has been paying a liberal price for the fruit, and it has become so profitable that there may be some excuse for giving it the prominence it has attained. Still, there are other varieties of fruit, both of the large and small varieties that can be made equally as profitable. Take for instance the first of the spring fruits, the strawberry, or, of the larger fruits, the peach, of which I am to talk to you this morning.



The first thing, perhaps in the growing of peaches, is the soil, and I fear that in this, very often, has been laid the basis for mistakes. We have been told that the peach will do best in a soil that is poor. I believe this is a mistake, and in the light of our present methods and knowledge, it does better to have a rich soil, although

we must be careful not to have too much nitrogen, so as to permit the trees to grow too rapidly, but I believe a good, rather heavy soil is the best. We have there in Ohio the Catawba Island section, which is a low, flat rather heavy soil, naturally underdrained by a layer of sand, which also acts as a conservor of the moisture; and there is also the section along Lake Erie, where the climate is moderate, and where they do not seem to feel the lack of air drainage so much as in some of the inland sections. We realize, however, that the peach will not thrive with wet feet.

In selecting a soil, I would give preference to a soil that is moderately rich, and well-drained; if it is not well drained, it should be made so. In your rolling country, you have an opportunity to select soil that is naturally drained. With us, in Ohio, we have to select our soils, and in many cases underdrain them by tiles very thoroughly. In selecting a soil for growing peaches, I would like to get a soil in condition to grow a first-class crop of potatoes, and one of the best ways to get it into this condition is to grow a first-class crop of clover and plow it down. We prefer to plow it down in the fall, and plant in the spring.

Some have been using the smaller sized tree. Having had trouble in securing suitable trees, I undertook to propagate some on my own place. They grew larger than any trees I had ever planted, and I was tempted to throw them on the brush pile, but I wanted to plant the trees, and could not get them the size I wanted, so I planted them,, and gave some to my neighbors, and they gave me better results than any other trees I have ever planted, and I believe we have been making a mistake in planting the smaller, weaker trees. I don't want an over-grown tree, but one that has enough vigor and constitution in it to make a good, vigorous growth.

Of course, in pruning you should prune it back to the single stem, at a height you want the tree.

There has been a great deal said about laying out the orchard. We have a very simple way. We simply take the double team and cultivator, and in that way we can lay out the orchard very quickly, and although there may be a variation of one or two inches in a few years it will not be noticed.

The Secretary.—May I ask whether you are on level or rolling ground?

Mr. Farnsworth.—I have fairly level ground. You cannot lay down any hard and fast rule. That makes our profession better than any other. The carpenter knows that if he makes a rule, the joint will come at a certain place, no matter which wood he uses, but in our work we know that this is not so. I am speaking of my own experience, and my soil is fairly level. On rolling soil this plan might not work so well.

After we have the soil in proper condition, and the orchard laid off, we are ready for planting. See that the trees are received in good condition. We use a low down wagon for our planting—one with crossed reach so that you can turn very easily. If the front wheels clear the tree, the back ones will do it also. We load

the trees on this flat wagon, and never leave them exposed to the air any length of time; then we drive on and set the trees in place. The planting is done easily and quickly in this way. One of the points on which many fail, is in leaving too much top on the tree. My idea is that if you can get four or five roots six or eight inches long, it is better than to have a lot of little fine roots. They simply get in the way. Then commence cultivation at once.

The first year raise small crops. In doing this, I would very much prefer to plant vegetables that can be cultivated early in the season. By handling the ground properly, I can get just as much growth as possible early in the season; then by stopping cultivation a short time before sowing other crops that will act as a cover crop, it will save the moisture in the ground, needed for growth later in the season. The strawberry is objectionable, because there can be no cultivation early in the season. However, we overcame that by throwing a mulch around the tree until the fruit is harvested, and then the berries are plowed.

Now, about pruning; this is a very unsatisfactory subject to talk about unless the speaker has a tree and a pruning knife. We may say, however, that the peach requires much more pruning than any other fruit. It is about midway between the apple and the grape in that respect. We cut out all the useless branches the first year, and cut the tree back to about 18″ or 20″. Then we afterward go over it each year carefully, although we do not cut so much as the first year. We think we get a better growth in this way. Then in the spring we go over it carefully and prune so that there will be no two branches directly opposite. If we think we have been a little too easy in the beginning, we cut more sharply. The peach, you know puts out new branches every year, and bears only on the new wood.

My soil, on which I am growing peaches, is a sandy loam, a good deal darker now than when I first got it, because of the humus I put in it. It is a very friable, mellow soil, but I find that I cannot cut back as severely as they can on heavier soil. In my case, I have been obliged to give the trees a little more room than is usually allowed. I would rather have a few less trees and give them the room to spread out, so as to get the sunshine and air and get the proper color, than to have double the number of an inferior quality and flavor. My last orchard was planted 22 x 25, of Elberta and Kalamazoo. This may be a little more than necessary, but I think the tendency is to give a little more room. It was my privilege to spend three or four weeks with the fruit growers of Michigan. The people up there grew peaches on sandy soil, and got splendid results. They gave clean cultivation, but they failed to give the cover crop, and the result was that in a few years the soil was robbed of its humus, and the peaches began to fail with the Yellows and the Little Peach, and in a very short time, the peach industry of Michigan sank to a very low ebb, and to-day there are many less peach trees grown in Michigan than were fifteen or twenty years ago. They are beginning to realize the necessity of keeping humus in the orchard if they want to make a success of raising peaches.

It is with the fruit just as it is with the animal; in cold, hard weather, the weak, sickly animal will succumb; and so it is with trees. Our method is to start cultivation early in the season, and cultivate largely the early part of the season. Our time of starting cultivation will depend largely upon the weather, and the character of fruit the tree is bearing. If it is a light, and a rainy season, we often stop the first of July but if it is dry, and the crop is a heavy one, we often cultivate on right up to the first of September.

Now, then, as to the cover crop; in our orchard work we often use oats or barley, preferring barley. We have to use something that will make as great a growth as possible before the winter sets in, and plow it as early in the spring as possible, so that it will not take up any of the moisture that the tree needs. In the case of a young orchard, where we can sow early, we use clover or vetch. We have been growing vetch for fifteen years. It has a tendency to creep on the ground so thoroughly that it keeps out the frost, and if you can keep it growing in the Spring, it will be of great service.

It has been said that manure is a poison to the peach, but I think that after the orchard is established and has borne one or two full crops, we can very profitably use more stable manure on it than most of us have been doing. This also depends somewhat on the variety. The Elberta will stand more manure than any other variety. As one of our growers puts it, "the Elberta is a hog for manure." In the spring of 1909 I gave quite a liberal supply of manure to an orchard that had borne two or three crops, putting on about fifteen tons to the acre. We had sprayed that orchard the year before for the scab, and it denuded the trees, and to remedy it, I gave them this application. The result was that the growth for 1909 was very satisfactory, and last year we picked over 600 bushels per acre from that orchard, all running very high in quality. So I believe that in connection with the phosphoric acid, we can use larger quantities of the stable manure to supply nitrogen. We use the South Carolina dissolved rock, and apply it at the rate of forty pounds to a ton of stable manure and spread it at the same time. I believe that we get better results by balancing it up this way.

The matter of spraying has been developed largely in the last few years. A few years ago we sprayed only for the Scale, but we find that by using the lime and sulphur, it takes care of the leaf curl. For a long time the rot and spot and scab were very prevalent; then we began to use Bordeaux, using it very weak; we began by using about a pound and a half of the copper sulphate to three or four pounds of lime and fifty gallons of water. But we found it hurt the foliage, and then we learned of the self-boiled lime-sulphur, and we find by its use that we can control all these pests. For the curculo, we spray two or three times with arsenate of lead. The Yellow St. John seem more susceptible to this pest than any other variety.

I want next, to speak for just a moment about thinning. Until recently, growers seemed to think that thinning was all right in theory, but not in practice. I went up to the meeting of the Roches-

ter fruit growers a few years ago, and found some of them rather inclined to sneer at it, but it is something you cannot afford to overlook. It is a good deal more profitable to sell peaches at $2.50 a bushel than at $1.50, and while the consumer may be inclined to grumble a little at first, a week or two later he will remember only the quality. Give them the best and give them a square deal, and they will come back again. I believe that a good many of us are a little inclined to be short-sighted in that respect. We seem to think that if we only get the consumer's dollar it ends there. But it does not end there; we want that consumer to come back to us again, and the surest way we can get him to do this is to give him good value for his money and not overcharge him.

We begin to thin immediately after the June drop because those peaches remaining on the trees take up the moisture and fertility required by the peaches we are going to market. Now, in thinning

Thyme on the Farm of Frank Shallcross, Frankford, Phila., Pa.
See Address of Prof. R. L. Watts.

there is no hard and fast rule to follow any more than there is in any other line of our work. Some say 6" to 8"; but the best way is to go into your orchard and look it over, and then get the right distance. Most of us err on the side of not thinning enough, rather than too much. I thin all kinds of fruit in my orchards—apples, peaches and plums, and get my best results in that way. We began to thin our plums last spring, but in the midst of our thinning, cherry picking time came on, and we were obliged to drop everything for at least five weeks and get our cherries off; and at the end of that time, we found that on the trees that had been thinned, the plums were 50% to 75% larger, and we got more bushels.

Now, just a few words regarding picking and marketing. I think a great many growers do not do enough work on their fruits

to get the best returns. Some growers pick them all at one time. We go over our peaches every other day, and then make several grades of them. It means extra work to do this, but you get better quality, better work, and the consumer is better satisfied. We are better situated for marketing our crop than a great many growers. We are within half a mile of an electric road that gives us unequalled service. They place a car on the siding for us every night, and we keep our fruit in cold storage until evening, and then put it on the car. Early in the season we use the eight-pound basket, like the grape basket, because at that season most of the fruit is used for eating. Later in the season we use the half bushel and bushel basket. For long shipments we use what is called "the seven-eighths basket," which will hold a full bushel heaped up. We grade our peaches carefully by hand, and then cover the basket and set it in the car carefully, so there will be no bruises. Then in the evening this car is taken out behind the regular car and shipped South. We have found that it is a mistake to depend entirely upon the larger towns. In towns of five to six thousand they have not the facilities to get fruit that the larger cities have, and they are glad to pay the price. Also, early in the season, we go to see the grocers, and arrange with them to handle our fruit; we work for their interest and expect them to work for ours, and it is usually very satisfactory to both sides. One of the firm goes with the car and sees that the fruit goes where it is intended to go, and gets there in good condition. Of course, this is unusually good service, but I think you can easily prevail on your trolley company to give you the same kind of service, especially if there are competing lines near you, or the trolley has a railroad to compete with. You will be astonished to see the number of peaches you can market right near home.

Possibly this is all the time I should take, because I believe in allowing plenty of time for discussion.

A Member.—What do you think is the best distance for peaches?

Mr. Farnsworth.—That will depend on soil and variety. I am planting smaller sizes 20 feet apart and larger ones 26 feet.

Mr. Thomas.—How do you treat the borers?

Mr. Farnsworth.—We go over them about twice a year; you can mound up in the fall, when there is not much to do, and it will be of some help, but I think our preventative spraying is the best method. We have very few borers.

A Member.—Do the roots of the trees ever give you any trouble in the tile?

Mr. Farnsworth.—No, sir; if I were draining a stream or a pond they might.

A Member.—Have you ever tried painting trees with white lead and linseed oil?

Mr. Farnsworth.—No, sir.

A Member.—What varieties of peaches do you use?

Mr. Farnsworth.—The last orchard I planted, I used the Carmen, the Champion, Yellow St. John, New Prolific, Kalamazoo, Elberta and Golden Drop.

A Member.—How much later does the Kalamazoo ripen than the Elberta?

Mr. Farnsworth.—Well, it is a little bit later, but it begins to ripen before the Elberta is gone.

A Member.—Almost the same size as the Elberta?

Mr. Farnsworth.—No; it is a smaller peach. We have found the Elberta a profitable market peach; some growers do not grow anything else, but we have found it advisable to grow something a little different that we can sell a little cheaper for canning. I am planting more Gold Drop and less Kalamazoo.

A Member.—Have you used commercial lime-sulphur on peaches, and if so, with what effect?

Mr. Farnsworth.—I have not; I know of a number who have, and I am going to try it this year; it is still in the experimental stage.

A Member.—How many sprayings do you give for rot?

Mr. Farnsworth.—Twice a year, of course, with some of the later varieties it might be well to spray three times.

Mr. A. R. Tyson.—Does the self-boiled leave a sediment on the tree?

Mr. Farnsworth.—Yes; it is apt to do so.

Mr. A. R. Tyson.—Has the time of cultivation in the spring any effect on the buds coming out?

Mr. Farnsworth.—Well, I know some growers do not want to cultivate until the blossoms begin to fall, and you are losing moisture, but I like to go over my orchards just as soon as I possibly can in the spring.

A Member.—Have you any rot?

Mr. Farnsworth.—I had until we began to spray.

A Member.—When do you spray for it?

Mr. Farnsworth.—About two or three weeks after peaches have formed; and about ten days afterwards.

A Member.—Do you use arsenate of lead with the spray?

Mr. Farnsworth.—Not when we are spraying with self-boiled lime-sulphur.

A Member.—Is the Gold Drop subject to rot?

Mr. Farnsworth.—Not so much, we find, since we have been spraying; the Champion is.

A Member.—Do you have much trouble with the Yellows?

Mr. Farnsworth.—No; we have never had any trouble in our county.

Prof. Surface.—What time do you spray for the rot?

Mr. Farnsworth.—About two or three weeks after the blossoms drop. I believe, however, that our dormant spraying with lime-sulphur has a great deal to do with our getting rid of the spores that hold over.

A Member.—What do you do for curculio in the peach and plum?

Mr. Farnsworth.—In the summer we spray with lime-sulphur, about 1-40, and about 2 pounds of arsenate of lead to 50 gallons of water. For curculio we prefer to spray from one side one day, and then wait a day or two and then spray from the other side. The next time we spray simply with the arsenate, and the third time, which is usually the last time, we again use the lime-sulphur and the arsenate of lead. We not only want to kill the Scale, but we are controlling the fungus diseases at the same time, and incidentally we are cleaning out our currants, which grow in the same orchard.

A Member.—What has been your experience in spreading out young trees, leaving three or four main branches, and then not cutting away much wood, but practising summer pinching?

Mr. Farnsworth.—I have done that the second and third years.

A Member.—In buying the Gold Drop, are you sure you get the variety?

Mr. Farnsworth.—There is nothing sure except death and taxes.A pretty good way is to write to the nurseryman first, and

ask him what he has, before you tell him what you want. It is just like a man coming to you for advice; find out what he is after, and give him what he wants, and he is your friend, and has a very high opinion of your ability.

A Member.—Do you use the European varieties of plums?

Mr. Farnsworth.—Entirely so; we tried the other, but did not find it profitable.

A Member.—What variety of plums do you grow?

Mr. Farnsworth.—Many of them—the Bradshaw, the Niagara, the Lombard, the Reine Claude, the Monarch and Grand Duke.

Prof. Surface.—Does it pay to grow plums as well as peaches in the same soil?

Mr. Farnsworth.—Well, it has not done so heretofore, but it is beginning to do better the last year or two. I believe it is advisable to spread your crop over the year, rather than to have only one variety.

Prof. Surface.—Do you use peach for filler in your apple orchard?

Mr. Farnsworth.—No; I use apples—the Jonathan or the Wealthy or something of that kind.

Prof. Surface.—Do you grow currants under your peach trees?

Mr. Farnsworth.—No; I grow them with the apples and plums.

A Member.—What strength do you use the lime-sulphur?

Mr. Farnsworth.—1-33 on the apple, and 1-40 on the pear, peach and plum.

Prof. Surface.—With what results?

Mr. Farnsworth.—The very best.

The President.—Before adjournment I want to announce the following committees:

Committee on Resolutions.—Mr. F. H. Fassett, Mr. J. W. Prickett, Mr. Abram Hostetler, Mr. U. W. Harshman, Mr. S. L. Brinton.

Auditing Committee.—Mr. John F. Boyer, Mr. A. O. Finn, Mr. T. C. Foster.

WEDNESDAY, JANUARY 25, 1.30 P. M.

President Hiester in the Chair.

TOMATOES.

By C. W. Waid, *New Carlisle, Ohio.*

We will first consider the growing of tomatotes for the canning factory and late tomatoes for city markets. There are limitations to the profitable production of tomatoes at canning factory prices. One of the most successful growers in our locality discontinued growing for the factory recently because he found that the distance he was obliged to haul, about four miles, reduced the profits to too low a figure. The distance which a grower can afford to haul tomatoes to the factory will depend very largely upon the character of the road over which he must haul. Tomatoes can be grown profitable at factory prices only when the soil is in a condition capable of producing at least 200 bushels or six tons per acre. Even at this figure the profits are small. If 350 or 400 bushels can be grown the profits are very satisfactory. Another drawback to the growing of tomatoes for the factory in some places is the difficulty of securing sufficient labor at picking time.

These limitations will apply equally well to the growing of late tomatoes for the city markets. The labor problem is even greater than when growing for the factory owing to the extra labor required in the cleaning, grading and packing of the fruit. With a given amount of help a considerable larger area can be grown for the factory than for the city market.

We have been growing tomatoes for the factory at $8.00 per ton or about 24 cents per bushel. Our place is two and one-half miles from the factory and twelve miles from a city market. I consider this price comparable with 50 cents per bushel in the city. This difference would be somewhat reduced if we were nearer the city market. It is quite a satisfaction to know that all of the crop is sold even if the price is low as is the case when contracting to a factory.

The Soil.

Late tomatoes can be grown successfully on a wide range of soils. A sandy loam is perhaps to be preferred to any other type although a clay loam is very satisfactory. In any case the soil should be well supplied with available plant food and organic matter. A poorly drained soil is to be avoided as is one that dries out too easily. An application of stable manure supplemented with phosphoric acid and potash and in some cases nitrogen will increase the yield on nearly all soils. The amount of manure or commercial fertilizer which it will be profitable to apply will depend on the previous treatment of the soil. When the soil is rich and full of

humus the aplication should be comparatively light as too much available plant food in the soil will grow vines at the expense of fruit. With us the Stone is grown more than any other variety. If it could be bred or selected so that it would begin bearing two weeks earlier it would be an ideal tomato for the factory or city market.

There is no greater mistake made in connection with tomato growing than the setting of small spindling plants. This mistake is more commonly made by those who grow for the factory because of the poor facilities which they frequently have for the growing of the plants. When the factory people raise the plants themselves they often grow them too thickly and thus send them out in bad condition.

Another serious mistake is the carelessness about the source of the seed supply. When the company furnish the seeds they often purchase them at the lowest price possible. The idea seems to be common that any quality of seeds that will grow is good enough. At most the seeds for an acre cost very little and the best obtainable are none too good. Another cause of serious loss in our locality is the lateness of the setting of the plants. The season with us is not long enough to mature all of the fruit on late kinds and a delay of two or three weeks in planting means a big loss in the fall.

We sow the seeds for our late tomatoes about March 15th. As soon as the plants are large enough to handle they are pricked out into flats about two inches apart. When they begin to crowd they are transplanted either into two-inch pots or into flats again but given more room. If potted the pots are plunged into soil between the tomatoes in the greenhouse. Plants grown in this way are stalky and can be planted with a tobacco planter or by hand. We set four acres to this kind of plant in one day last season with the aid of a tobacco planter. No water was used as the soil was in a moist condition. The ground had been marked one way and the boys dropped the plants in the marks. They did a much better job than I expected and while it was some more trouble than it would have been to have rowed them only one way it was a decided advantage to be able to cultivate them both ways. Nearly every plant grew thus we secured an excellent stand.

When the plants are small the cultivating is done with a two-horse cultivator. After the vines begin to spread we cultivate with a one-horse cultivator once in a row. We cultivate to conserve moisture as well as to destroy weeds. If the cultivating is done at the right time and frequently enough no hoeing and little weed pulling will be required. If the soil becomes cloddy on the surface it is a good plan to run through the spaces with a plank drag. Women make good pickers and boys and girls can be used also if an older person is with them. We pick in baskets and empty into crates. A flat hay rack or ladders as they are sometimes called, mounted on a low wagon makes a good conveyance for hauling. Springs should be placed under at least one end of the rack. In hauling tomatoes long distances they carry much better in small baskets than in bushel baskets or crates.

Two Types of Swiss Chard Grown by Walter Yahn, Onley, Phila., Pa.
See Address of Prof. R. L. Watts.

Early Tomatoes.

The profitable production of Early tomatoes has greater limitations than the profitable growing of late tomatoes. Early tomatoes can be grown successfully only on certain soils. Besides the requirements which were mentioned for late tomatoes the soil should be what is popularly called an early soil. A sandy loam with a southern exposure is generally considered best for early tomatoes. Clay soils are not well adapted to this purpose. It is also important that the location be near a good market or shipping point. Unless the person who grows early tomatoes has a greenhouse or hotbed in which to start the plants or can buy them already grown in one of these places his chances of success are slim.

It is of even greater importance that good seed be secured for early tomatoes than for late. We should not only have a good variety but the best strain of the variety we select obtainable. In my judgment there is much yet to be done in the way of improving the tomato. We may not need new varieties but we do need better strains of the best varieties now grown. Have you ever kept a careful record of the yield of a number of plants of a variety grown under similar conditions? If not try it and see for yourself what a variation not only in total yield but in time of ripening these plants show. Some plants will ripen all or a large part of the fruit at one time and early in the season while others will ripen the bulk of their fruit late in the season or a little at each picking throughout the season. Some plants will produce two or three times as much as other plants adjacent to them. Is this all due to variation in environment? Much of it may be due to soil variation but I am confident that some of it is due to what we call inherent tendencies

or the power of the plant to reproduce itself without respect to its surroundings. When we save seed from a fine tomato which has been selected from a basket of fruit we may be getting just the kind of seed we do not want. We often find the finest specimens of fruit on vines which have very few fruits on and are therefore not productive. When we select specimens to save for seed from a basket we know nothing of the character of the plant from which they come. It is very important therefore that we take into consideration the entire plant when making selections for seed or our work will be useless. If we expect to do thorough work in the way of improving the tomato by selection we should save seeds from a few specimens of several apparently productive and otherwise satisfactory plants and test them out for several seasons much after the plan followed by the corn breeders in their ear-to-row work. The fact that tomatoes can be propagated from cuttings and thereby kept pure should be of great help in this work.

Where a strictly early variety is wanted it is doubtful if there is anything superior to the best strains of Earlian. For medium early the Beauty is a first-class purple sort and Chalk's Early Jewel a good red tomato.

We grow the plants of the early varieties in much the same way as we do the late sorts except that the seed is sown two or three weeks earlier. In transplanting the second time the plants are set in four instead of two-inch pots. This enables them to grow to a larger size without becoming pot-bound. The plants are removed from the pots at the greenhouse when we are ready to plant them and hauled to the field in flats made from glass boxes.

The last two or three seasons we have had long spells of cold wet weather after some of our early plants were set in the field. The plants set after the cold spell have always done better than those set before. From this experience I have come to the conclusion that it is not always advisable to be in too much of a hurry to get the plants in the field.

With us there is not as much staking of tomatoes as was practiced a few years ago. The scarcity of help recently has no doubt had some influence along this line. Where it is not necessary to economize space mulching with straw will answer much the same purpose as staking. The mulch will keep the fruit clean and at the same time conserve the moisture. One of the drawbacks to the use of mulch is that it affords a hiding place for crickets and other insects which perforate the skin of the tomatoes and render them unsaleable.

Greenhouse Tomatoes.

Tomatoes may be grown in the greenhouse the year round if desired. A few of the Ohio vegetable growers devote a part of their houses to tomatoes each fall. They aim to have them ripening at least by Thanksgiving time and in some cases considerable earlier. It is important to have the plants and fruit as well quite fully developed before the usual dark, cloudy weather of winter sets in. Tomatoes require sunshine for their best development but when the

fruits have attained their normal size they will ripen even in cloudy weather. The plants of the fall and early winter crops are allowed to produce fruit as long as they give profitable returns. Such seasons as the present when we have so few clear days the fruits ripen very slowly but on the other hand prices have been good, partly as a result of the slow ripening.

A much larger area is devoted to tomatoes in the spring and early summer than in the fall. We do not grow any in the fall but make a specialty of spring tomatoes. Tomatoes are a very satisfactory crop to grow under glass when weather conditions are favorable as is usually the case in the spring. There is a beauty and quality about greenhouse grown tomatoes which makes them superior to those grown in the field even when the field grown fruits are allowed to mature before being picked and there is a very wide range of quality between the grenhouse tomatoes and those which are picked green as is usually the case, of necessity, with southern grown tomatoes. Those who know the difference in the quality of greenhouse grown and southern grown tomatoes are always willing to pay much more for the former. We have been able to get $2.00 per bushel for greenhouse grown tomatoes when early homegrown field tomatoes would not bring over $1.50.

Varieties.

There is quite a difference of opinion among growers as to which varieties are best adapted to forcing. It should be understood whenever this subject is under discussion that the varieties which are suitable for spring and early summer forcing may not be satisfactory in the fall and vice versa. The small fruiting varieties are the best for fall forcing as the markets at that season demand small fruits. In the spring larger fruiting varieties can be grown as the prices are not as a rule as high as in winter and thus the trade is not as particular as to size. The small fruiting sorts produce such very small fruits toward the close of the season that they do not sell well when they are forced to compete with the larger fruits from the south and the local field-grown crops. The fruiting season in the greenhouse with us extends from June first to August fifteenth, thus we must sell in competition with southern-grown tomatoes from the start and with local field-grown tomatoes toward the close of the season. Our list of varieties this year consists of Magnus, Beauty, Globe, Stone and Grand Rapids Forcing.

Starting the Plants.

We have found it necessary, owing to the very dull winter weather which we have experienced the last two or three years to sow the seeds soon after the first of November. If half or more of the days were fair it would not be necessary to start the plants until about December 1st. We aim to have the plants ready to set in the permanent beds about March 1st. This brings them into fruiting about Decoration day. In some localities it would no doubt

be better to get the plants in their permanent places earlier but with us February is usually a pretty cold month and we prefer to keep the plants in the plant house until the worst of the cold weather is over. Then too we plan to have the second crop of lettuce coming off the last of February and first of March and the tomatoes are set with the third crop of lettuce.

The plants are transplanted three times the same as for Early field-grown tomatoes. When a crop of lettuce is grown with the tomatoes it is best to have the lettuce started before the tomatoes are set in the beds, but this cannot always be done. The lettuce should not be allowed to crowd the tomatoes too much as it will make the plants spindling. Lettuce grown in this way will be light in weight but the returns usually justify the effort necessary to produce a third crop.

The tomato plants are set about eighteen by twenty-one inches apart. A home-made wire, twisted into corkscrew form at one end and looped at the other is screwed into the ground by the side of each plant. Wires are stretched the full length of the greenhouse directly over each row of plants and above the truss rods which support the roof. A string is fastened to the loop below and tied to the wire above. In training the plant up they are twisted about the string or tied to it with raffia or both. All suckers or side branches are broken off when small. Only one stem is allowed to grow to each plant. Our beds are six feet in width thus four rows of tomatoes are set in each bed. This makes it very convenient for work with the plants when pruning, pollinating or picking. It is not advisable to set closer than this distance and some growers prefer two by two or even two by three feet.

Pollinating.

As soon as the blossoms commence to open hand pollinating begins. We use two sticks about 18 inches in length for this purpose. One stick has a spoon shaped end whittled into it and the other a spatula at the end. To pollinate the ladle is held under the flower and the blossom tapped gently with the spatula. This jars the pollen into the ladle and when a sufficient quantity of pollen is secured to show in the ladle the flowers are pushed into it until the end of the pistils touches the pollen. The releasing of the pollen and the placing of it on the pistil is done in one operation after a start has been made. We aim to go over the plants every other day and all of the blossoms which are fully open are treated at each operation.

There is a good deal of difference in varieties as to the need of hand pollination. Some varieties will set much fruit without any hand pollinating while others will set almost none. When the blooming period comes at a time that will permit of wide open ventilators much of the time hand pollinating is not so important as when the houses must be kept closed or nearly so a good deal. We think it safer to do a little more work than necessary than to run the risk of heavy loss through a small saving in labor. Care

should be taken to do the work with as little injury to the pistil as possible as rough fruits often result as a neglect of pollinating or from careless pollinating.

Picking and Packing.

The picking is done three times a week. Only the specimens which are nearly or fully colored are picked. The grading is done on a bench made for that purpose. Two grades are made and all fruits which are included in the first grade must be smooth and not below a certain size. The second grade is made up of fruits too small for seconds but not too small to be marketable and those that are a little rough but not rough enough to make them unsightly. It should be said in this connection that greenhouse-grown tomatoes are much more liable to be rough than the same varieties grown in the field.

We pack in small baskets similar to those used by many southern growers weighing out five pounds in each basket. These baskets are packed in crates made to hold four baskets or twenty pounds. This is a neat package but is adapted only to warm weather shipping.

We seldom get more than $2.50 per crate nor less than 75 cents and that only at the last of the season. Two pounds per square foot of bench space is considered a good yield. The supply of southern tomatoes on our markets governs the price which we are able to get for the greenhouse stock to a considerable extent but when the trade has once learned to know the difference in the quality of the greenhouse grown and southern grown tomatoes, there is little difficulty in disposing of it at quite an advance over the southern stock. The markets could handle to advantage many times the present output of greenhouse tomatoes.

The President.—Don't you grow head lettuce at all in Ohio?

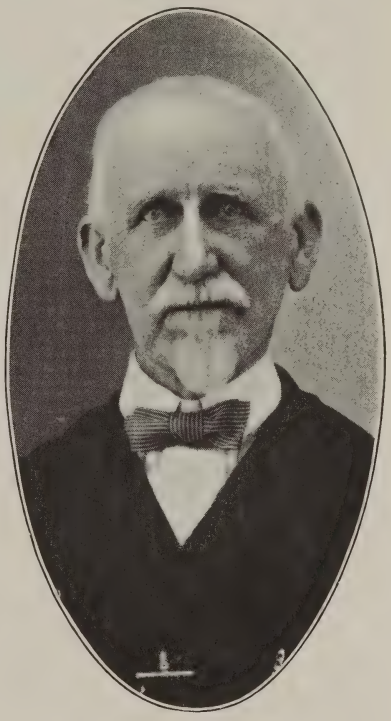
Mr. Waid.—No; the reason is because we don't succeed, and our people seem to prefer the other kind.

STRAWBERRIES.

By J. W. Kerr, *Denton, Maryland.*

No other fruit plays so diversified and inconsistent a roll as this. Under, even ordinary management, it is renumerative to the grower and most acceptably increases his revenues wholly independent of the tariff. It presents itself at a season of the year when its refreshing acidity is an unfathomable joy. In communities where grown on a large scale, it becomes the innocent disorganizer of the household and a harassing family nightmare. Two cents per quart for picking presents a temptation that mobilizes and leads to the barracks hastily improvised for them all the house help, for miles around, without limitations as to color, nationality or religion; nor

does it stop at robbing the housewife of her help, but all too frequently, able bodied men hired by the year to work on the farm, suddenly fail to answer the roll call of their employers, and hie themselves with their wives and children to the berry fields. It is quite natural, when house-hold customs and out-door interests on the farm both are so severely jolted, that the cause should be severely criticised and denounced; but that little blushing sinner of a strawberry just keeps on covering itself with blushes, so as to better its chances to imitate the smart country girls and boys that are swallowed up in the large cities.



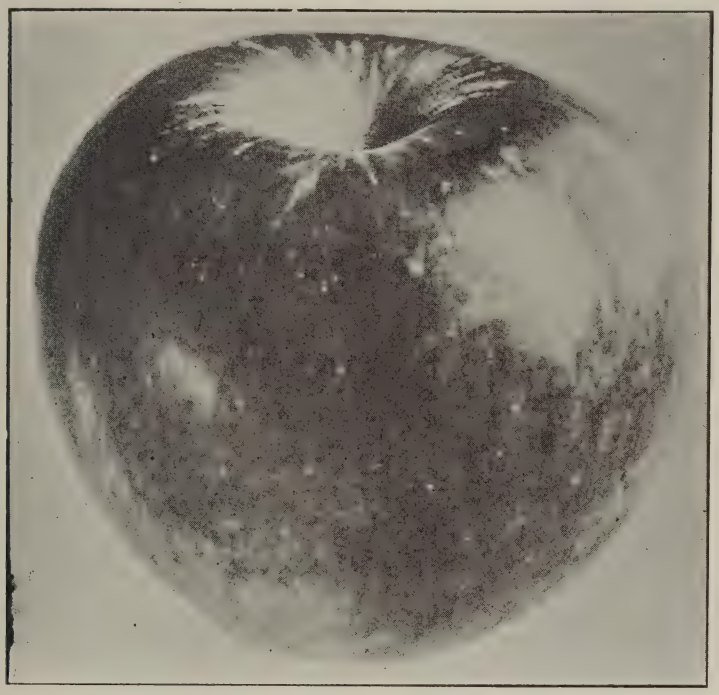
"Between the bays" the strawberry (to put is accurately) is exploited rather lavishly. From one, to one hundred acres of strawberry plantation, under the management of one man; and inconsistent as it may appear on its face, the larger the acreage, the more thorough and business like, from start to finish, is every detail and essential, which as a rule, at the final wind up of the season, writes the broad strawberry smile on the Christian countenance of the man behind the check book.

The large growers by force of circumstances, affecting soils more particularly, but market peculiarities to some extent also, may differ in the minor lines of procedure, but in the great essentials of the work their operations are in exact accord. In explanation one grower may possess a liberal acreage, that nature has fitted in important particulars, for the successful growing of some varieties,—fastideous in soil requirements; and such kinds, — to the exclusion of varieties more generally adaptive to different soils, are most successfully and profitably utilized. Again, the grower may not have on his farm, the kind of soil upon which such varieties can be depended upon, for a good and profitable yield. Ask this grower to explain the absence in his plantation of such kinds and he will truthfully tell you that they don't pay him. In the county where I live there is one of the largest growers on the peninsula—a man noted for his enterprise, and clear-cut business thoroughness; this man grows and picks from twenty to thirty acres annually of the Gandy, a late variety that will never disclose its full capabilities unless on a moist rich soil. The gentleman I have in mind bought such land adjoining him at a nominal figure, because it was wet and swampy

and overgrown with bushes. Cleared up, and a good system of underdrains installed, made it ideal land for growing the Gandy strawberry to perfection. There are other late ripening kinds that doubtless are more satisfactory on land affording less moisture, but on somewhat low, dark, loamy soil, with clay subsoil, the Gandy holds the Blue Ribbon.

None of the large growers so far as I am aware use the planting machine for setting their plants. While for certain kinds of vegetable plants this machine is used to some extent, strawberry growers prefer the disk marker to open the rows; setting the plants by hand to the bar side of furrows thus prepared. The plan of cross marking the land and setting the plants at the angles of the squares, sufficiently distant from each other to permit the passage between them of a narrow cultivator, and cross cultivating, while it lessens the expense of hand hoeing considerably, is making no great gains in popular favor. What is everywhere known as the matted row plan is given the preference. With the strawberry, as with all other fruits; results are dependent upon the efforts bestowed in their production. In the matter of cups and crates, wonderful progress has been made. Did the strawberry growers of to-day have to pay as much for cups and crates as was the case fifty years back, their business would promptly collapse. Think of it—$30 per 1,000 for quart cups; $2.00 each for thirty-two quart crate. The gift quart cups at that period could be had at ten dollars per thousand in the flat, the growers putting them together themselves. Under present conditions the forty-eight quart crate is most popular and is furnished, including the forty-eight cups and divisions for less than forty cents each. The old go-as-you-please plan of shipping, every man for himself, single handed, bush-whacker like, had a much longer lease of existence than it deserved. Metaphorically the tail had to wag the dog before escape from the old growers was practicable. Almost at the extremity of the peninsula a few years ago, a fruit and vegetable exchange was organized and conducted on sound business principles. Results were a genuine revelation. To-day branches of that exchange in nearly all the peninsula counties are substituting system and method for the "Any-way-so you-get-there" practice that formerly attenuated the bank accounts of the shippers. These exchanges are in constant touch with the market conditions of all the cities and large towns that are in timely reach of perishable products, and the goods have daily consignment to points where prices are most inviting. At some points strawberries, as well as other fruits, are sold at public auction by the exchange, thus introducing a mild form of speculation, that imbues the buyers and the growers with the excitement of expectancy. The loaded wagons are driven to the stand of the Auctioneer, the berries are hurriedly examined by the buyers that locate at these points. If the bids are satisfactory the grower accepts and returns home with the money for his berries in his pocket. If the grower suspects any understanding among the buyers to co-operate in fixing prices, they ship through the exchange instead of selling at the railroad station. The inauguration of these long needed reforms

insures to every member of such exchanges a fair and just value for his fruit. If it is extra fine in quality and condition, the quick perception of the buyer is prompt in acknowledgment. On the other hand, where fruit grades low, the grower receives a very impressive admonition to mend his ways.



Stayman Winesap From Mr. Kerr.

We sometimes read of marvelous results and achievements by special methods of cultivating or growing this fruit; and while such sensational revelations may be true in a prescribed sense, when the entire story is told, instead of inspiring the confidence that would beget widespread invitation, it is soon lost in the flitting shadows of forgetfulness. In localities where the growing of this fruit is made a business, every principle of economy and progress is worked out in finest detail by men whose financial prosperity demonstrates quite clearly that they not only excel in the business requisite but also that penetrating and comprehensive study of plant nature, that insures to each variety, situation and soil fertilization, such as its individualtiy craves, and must have to make it profitable. By the unerring scales of practical test, they determine the value of novelities, and the new variety is thus accurately analyzed as to its merits. Where plant growing as a business proposition is not combined with fruit growing, a very small per cent. of the annual new productions are observable. You find that disturbing desire for new kinds far more pronounced and conspicuous among the small growers than those higher up. The advent of the Hovey back in the thirties,

though a pistillate, was a long stride forward in American strawberry development. The introduction of the Peabody in the fifties triumphantly marked a great epoch. This fact was especially noticeable in its relation to the breeding or originating of new varieties. The five dollars per dozen for plants, as received by the propagators, who got in on the ground floor, when the Peabody tide was at its flood, caused many who were horticulturally inclined, to see visions, and to dream golden hued dreams, when they were not sleeping. A steady shower of new varieties began to fall upon the public; tinted by the glittering crystals of beguiling hopes and the fascinating charms of unbridled expectancy, hundreds of these little innocents still in their swaddling attire of gorgeous tinsel, were adjudged and condemned as horticultural "goldbricks." They simply made a faint and brief little twinkle, and were promptly replaced by that same shower which seems as though it might "go on forever."

In Fuller's small Fruit Culturist, published in 1867 there are named one hundred and twenty odd varieties of strawberries of American origin. In a revised edition of this work, published fourteen years later (1881), the same author only names 94 American varieties. In neither list is there a variety named that is regarded as profitable or desirable by the successful growers of the present. In 1867, Orange Judd and Company published the first volume of their horticultural annual or year book, and in the Introduction by the editor this sentence occurs: "We differ as much from Europe in our horticultural operations as we do in other matters, and it will be a long time before we attain—if we ever do—that state of refinement that comes of a dense population, cheap labor, and great individual wealth." I take it that the word refinement as it appears in that somewhat remarkable sentence has reference to our horticulture only. Be it so, and what do we behold as we look through the Kaleidoscope of progress during the interval between 1867 and the present? Surely the great wealth of individuals no longer bars us from full participation in the ennobling distillations of that European refinement in horticulture. If growing a car-load of strawberries where but a crate was grown in 1867, and distributing the same, at prices so as to make them available to the pent up residents of all our large cities, if this tends toward refinement, our American horticulture is giving its European cousin the busiest time in its history, to maintain its supremacy. If however, a refinement of our horticulture is in any way dependent upon a pauperized condition of labor, it is infinitely preferable that it continue in its plebeian vulgarity. While the standard of excellence as to quality and size has made little if any advancement in strawberry culture, during the last half-century there certainly has been marked progress in meeting and supplying the essentials for field culture, in varieties embodying size, firmness and productiveness; features that vitally affect the interests of growers for distant markets. This question of varieties at best is so very local and circumscribed in its nature, that it resolves itself into a problem to be correctly solved by personal or individual experience only. The general and fixed peculiarities of the plant render it sensitive to any lack, or uncon-

geniality in soil conditions. One variety proves a rank failure where another is every way satisfactory, while perhaps not a mile distant the conditions as to behavior of the same varieties may be just the opposite of this, so that any discussion as to varieties is likely to develop as many sides to the question as there are growers present. When a grower has varieties that are adapted to his soil and situation he betrays a business weakness when by the glamour and glare too common in the introduction of novelties, he is induced to slight or neglect the known, for the specious uncertainty of the unknown. There is a difference, far reaching in its importance, between the commendable principles and spirit of enterprise and progress, as compared with that universal human thirst for change.

A Member.—I would like to ask what varieties you would recommend for home use?

Mr. Kerr.—Where do you live?

A Member.—In Cambria county—heavy clay soil.

Mr. Kerr.—There are a number of varieties that would succeed there, but there is one variety in particular that I think would do very well; it is safe, not so very large, but it is sweet, and it grows easily—Cameron's Early.

A Member.—What is your method of protecting in winter?

Mr. Kerr.—Mulching with straw.

A Member—Do you let the runners go or do you cut them off?

Mr. Kerr.—Well, we cultivate as long as we can, and then when we get in with the handhoe, if the runners are long we cut them off; if not, we let them go.

A Member.—What sort of implement do you use to cultivate?

Mr. Kerr.—The ordinary five-toothed harrow is used ordinarily. Sometimes we run over the plants with a weeder; this does not hurt.

A Member.—You speak of covering with straw; what do you do when it blows off?

Mr. Kerr.—We have never had any trouble in that way. We put it on in the fall, and it is tramped down when it is put on. It does not cover the plant entirely, and in the spring it is raked off and left in the row, so that the men can stand on it to pick the berries.

A Member.—As I understand it, on the Peninsula there are about a hundred acres out in starwberries on many of the farms?

Mr. Kerr.—Oh, yes.

A Member.—What I would like to know is, how any man can take care of a hundred acres, give them the care and proper cultivation?

Mr. Kerr.—Well, it depends entirely, just as in anything else, on the man. There is not one man out of twenty-five that is capable of doing that. There is not one strawberry grower in ten that can do it, but there are men who do do it, and some of these young men here who are not afraid of work, are going to do it.

A Member.—Well, where do they get their labor?

Mr. Kerr.—Well they make provision for that before they start out with the hundred acres of strawberries. The young fellows who do these things now-a-days know beforehand just what they are going to do, and where they are going to get their labor.

A Member.—Well, there has got to be a good deal of hand hoeing and weeding.

Mr. Kerr.—Yes, but not nearly so much as you think, because you cultivate until your berries get too large.

A Member.—I would like you to tell us something about your plan of culture—what is your means of fertilizing?

Mr. Kerr.—In the first place, our greatest dependence for fertilizers is on the fertilizer factories of Baltimore city. There are, of course, some exceptions; some prefer to fertilize with stable manure, but there is not nearly enough of this to go round. You know there is a great deal of fertilizer required by these plants, and the commercial fertilizer is being used by these growers very profitably.

A Member.—Another thing I would like to know—whether you consider it safe to plow down the fresh sod, so as to be safe from the attacks of the grub worm.

Mr. Kerr.—I think it is rather risky to plow down the fresh sod on account of the grub worm. Outside of that there could be no objection to it. However, the hoed crop would be profitable for another reason, because it would keep down the weeds; tomatoes, beans, or anything else that necessitates clean culture, so that you can prepare for your strawberries is all right. It may give you a little more work, but it will pay in the end.

A Member.—Have you been balancing up with the chemical fertilizer?

Mr. Kerr.—Yes; you have to keep the balance up very carefully as you go along. There is no question about that. And it

requires some spirited young fellow to keep up with the nitrogen, so that he does not get too much of that, and still gets enough.

A Member.—Do you depend on stable manure for your nitrogen?

Mr. Kerr.—No; we depend upon cover crops.

A Member.—How do you prepare for your second crop?

Mr. Kerr.—Well, some of them set fire to the straw and burn it off, and then give it a top dressing with some fertilizer that has a little ammonia in it.

Mr. Atwater.—I have a moderate sized strawberry bed, and also some hens; how do you overcome that?

Mr. Kerr.—You have my sympathy; and I don't doubt in the least that they are your neighbor's hens, too. In that case I don't care to offer advice, because I don't care to breed trouble between you and your neighbors. With the birds we simply surrender; we are not allowed to shoot them, and we cannot afford to cover our beds entirely, so we make the best of it.

A Member.—What analysis of the commercial fertilizer do you use?

Mr. Kerr.—Why, for strawberries, 6-8-10.

Mr. President.—I would like to call on our friend Hale, of Connecticut, to give us his impressions of our fruit since he was here last.

Mr. J. H. Hale.—Mr. President, and Gentlemen: Your worthy President says come up here because you want to see what I look like. A few days ago I took the train in New York, and was awakened in my berth by an argument going on between the porter and a lady who found she had to take an upper berth. She objected to this, but was finally convinced that there was nothing else to do, all the lower berths being full. "But," she asked the porter, "who have I got to sleep over?" "Oh," the porter assured her, "you needn't be afraid, lady; he's a mighty nice-lookin' old gentleman; got on here in New York." Now, that "mighty nice-looking old gentlemen" was me, so I can understand very well why your President wanted me to get up here so that you can look at me, and considering that you have had to look at him for the past two days, I don't wonder.

Now, answering the question that your President has put, you want me to tell you what I think of you since you have grown up; am I to tell the truth?

The President.—Yes; we don't want any bouquets.

Mr. Hale.—Well, then I'll be candid. Some years ago (I think it was ten years ago) I was invited to come over here and deliver an address, and a friend of mine told me "God pity you, Hale; they're a slow-going bunch of people; you can't put an idea into their heads; they'll go to sleep while you're talking to them." Well, some of them did go to sleep, but not many. Then, three years ago, I came back again, and found considerable more life and interest. Yesterday, in passing by this way in coming from Pittsburg, I decided to stop and see whether there had been any improvement over three years ago, and I was charmed with the crowd that was here yesterday, and particularly pleased to see so many live young people. I saw that there was hope and expectancy in the horticulture of Pennsylvania. And then I went over to that hall and saw the exhibit. The first time I was here there were probably a hundred specimens; the next time there were a few more of a little nicer quality. Today the exhibit shows what has been done by your Experiment Station and your teachers. It is a wonderful change, and it is a wonderful chance that is coming to us in horticulture.

Up in Spokane they are paying for fruit land three and four hundred dollars an acre, and for a planted orchard from six to eight hundred dollars an acre, and the people are paying it, and going away out there. People in my state, and in your own state of Pennsylvania, pay three to five hundred dollars for raw land, and eight hundred to a thousand dollars for land already planted, while there is land right here at home equally as good, at half the price, just ready to plant into an orchard, right in the heart of civilization, on railway lines that will take you to Europe or to California, or anywhere you want to go to spend some of that money you make in your orchard. You are close to the great labor markets of the world. Why, the modern grower here in the East, is in touch with the ports, where he can get all the labor he wants for $2.00 a day. Out there they have to pay in apple season from four to five dollars a day. And in addition, our fruit is incomparably better in quality. The Western fellows think their fruit is prettier than ours, but we know that ours is better. I took up one of their recent magazines (I think it was the January number) and it was filled with advertisements of the great and wonderful opportunities the West offers to the orchardist, but I turned over a page, and found sixteen advertisements of spray pumps, etc. Now, we people here in the East have wonderful opportunities. I don't think it is all Pennsylvania, or Connecticut, or New York or West Virginia, but the whole Eastern section of the United States, of which Pennsylvania is about the center, has the soil and climate to grow the finest fruit, and then, in addition, we are within twenty-four hours of thirty millions of people who consume it. The Western man has to pay $300 per car to get his produce to market, while you can do it for $30 or $40.

I enjoyed the talk of Mr. Powell and of the Professor with the slides last night, and of Mr. Farnsworth this morning—all plain talk, and all good, plain common sense. The low-headed tree, that is what we are coming to. I left Pittsburg yesterday, and came on here, not particularly through a horticultural country, but I saw a

good many fine trees. Heretofore we have had trees that took a thirty or forty-foot ladder to reach the top. Now we dehorn them, and we have trees where you can stand on the ground and pick the fruit.

We have been told that we cannot interplant an apple and peach orchard. I have done it. I picked a little over six thousand bushels of apples this yast year, and the pickers stood on the ground and picked every one of them. Next year I hope it will be ten thousand, and I expect every one of them to be picked from the ground, and the same thing with the peach orchards. Keep them down. You say, "how about cultivation?" Well, the man who is going to make money, is going to do it somehow. Keep your trees down.

Just one word more. In order to produce fruit properly, you must do a great deal of spraying. I keep spraying implements in all my orchards, and spray two, three or four times. I have tried every kind of a spraying implement, and I believe you will never get a thoroughly satisfactory spraying implement until you get air pressure. Compressed air makes it possible to do the greatest amount of work with the least amount of friction, and with the greatest economy. You will all come to it sometime; it may be next year, or in five years, or in ten years, but you will come.

I thank you, Mr. President, for this opportunity to say a few words, and let these people see what I look like.

The President.—We have been on very friendly relations for a number of years with the State of New Jersey; we have with us one or two delegates from their State Society, one of their ex-presidents, Mr. E. S. Black, and their secretary, Mr. Taylor. I want to call on Mr. Black to say a few words to us.

Mr. E. S. Black.—Ladies and Gentlmen (before I say "Mr. President," because I knew him before I knew you): I am glad of one thing, and that is, that Pennsylvania knows a good thing when you get it. I was here as a delegate from New Jersey when you elected Mr. Gabriel Heister your President, and I am glad you know enough to keep him. The next year you sent him down to New Jersey, as a delegate, and he came back so full of information that your society has grown since to an extent that I would never have known it, and, at the same time, Mr. Hiester left an impression on the New Jersey Society that has never been forgotten.

I always tell my people that they expect too much of me; they always put me on the program to speak after Herbert Collingwood, the most popular and eloquent lecturer that comes before our Society, and now I come over here to Pennsylvania, and you ask me to speak after Mr. J. H. Hale. I was glad to hear him say what I said to our secretary, Mr. Taylor, last night: that I was glad to see so many young men, and so many ladies present. I want to tell you, however, that when I was down at Hartford last year to visit the Connecticut Society, I saw Mr. Hale's son, that the son is better looking than his father, only he don't talk so much, and I'll lay my money on him every time. He is following in the footsteps of his father, only he is going to be more successful than his father be-

cause (let me tell you aside) what Mr. Hale did down in Georgia, he got a Jerseyman to do for him.

When I was here the last time, six years ago, you had a little exhibition of fruit that I was ashamed of, and I told you then that you would never get any sort of an exhibition until you offered prizes, and now look at your exhibit! You need take off your hats to no state except New Jersey. I told our Society last year that I was proud of it, and when I was in Connecticut last year, every man, woman and child said "I am from Connecticut," and seemed proud of it. I like to see that spirit, and when I came down the Hudson, and crossed into New Jersey, I felt that my foot was on my native heath, and that my name it was MacGregor. Next year I will have to tell our Society that Pennsylvania is fast approaching New Jersey. You have a thousand plates of apples, of every variety, and these young men who are here are laying up an investment that will, in the future, pay them better than any bank stock, better than government bonds, by making these hills and valleys of Pennsylvania grow fruit. Don't go to the city; stay here and while Pennsylvania may have a little graft, you also can grow fruit.

As Mr. Taylor and I came up from Philadelphia the other day, I saw some fine apple farms that were infinitely more attractive to me than that beautiful building up on the hill. In that you have sunk your money, and here you get your money to pay for it. I will say to these young men here, "don't leave the farm; don't marry a girl who wants to go to the city.' You know the girls have great influence over the young men, and the ministers realize this in the revival meetings, and get the young men into the church through the girls, so I will say to these young men, "don't marry any girl unless she is willing to go on the farm and roll up her sleeves sometimes, and do her part in the most beautiful work that man can engage in, the raising of beautiful fruit.

Be proud of your work. Be proud of your possibilities. Be proud of your president, and send a representative to New Jersey next year, and if we don't show you more apples, we will show you at least as many. I, personally, and my friend, Secretary Taylor, will go back to the New Jersey Society, and tell them that we saw here a fine-looking lot of men and women and girls, and almost as good apples as we can grow ourselves.

The President.—I would like Mr. Hostetler to tell us what they are doing in Cambria County. If you are doing well, we want to know it, and if you are not doing much, we want you to get busy.

Mr. Abram Hostetler.—Ladies and Gentlemen: I just expect to tell you what you asked for. About two years ago, Dr. Funk from the Eastern part of the State was on the Institute force, and he talked apple culture to us, and we got the idea of starting a County Horticultural Association, and with the assistance of an aged gentleman in our midst here to-day, and of Dr. Funk, we started the Society. As nearly as I can remember, we started out

with some seventy members, at our first meeting. We had a number of meetings, and last Fall we had a little exhibit that drew a great deal of attention. It was a very small exhibit compared with what we have here, but the people of the city of Johnstown seemed to be surprised that we could raise such fruit in Cambria County, just as the strangers seem to be surprised at the display here. We are keeping right on and doing our part. That is about all I have to say.

The President.—We find that one county after the other is coming in just this way. The first year there are only a few members, the next year some more, and then the next thing they talk about becoming bigger than our State Society, and this is what we want. We want each county organization to feel that they are the biggest and best part of the State Association.

Now, it seemed to me that we have reached a point in Pennsylvania where I began to fear we were getting swelled heads and did not know good fruit when we saw it, so we decided to get an expert Pomologist to judge our fruit, and we invited Colonel Brackett, the Pomologist of the Department of Agriculture at Washington to come here and do it for us.

Now, Colonel Brackett, give us your honest opinion of where you think we fall short in our display, because we want to learn how to succeed.

I now have the honor of introducing Colonel Brackett, the Pomologist of the Department of Agriculture at Washington.

IMPRESSIONS OF PENNSYLVANIA FRUIT.

By G. B. Brackett, *Pomologist, Department of Agriculture, Washington, D. C.*

My impressions of Pennsylvania fruit date back to 1876 when I had charge of the Pomological Exhibit at the Centennial Exposition. My attention was there first called to the wonderful productions of Pennsylvania orchards.

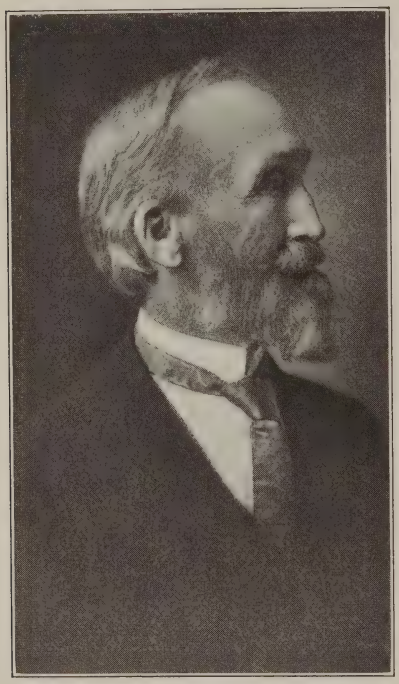
My connection with the Exposition required my attendance from its opening to its close, consequently it gave me an opportunity of examining fruit as it was placed on the tables beginning with the ripening of small fruits and continuing throughout the season until September when the great exhibit of tree fruits was made. It was the finest exhibit of its kind ever held in America up to that time. Twenty States as well as Canada and foreign countries were in competition.

Twenty prizes were awarded to Pennsylvania exclusively on her fruit exhibit. The apple was by far the most important fruit. The most popular varieties of this fruit exhibited at that time were Williams, Red Astrachan, Maiden Blush, Summer Queen, Porter, Fameuse, Gravenstein, Lowell, Jonathan, Baldwin, Yellow Bellflower, Swaar, Rhode Island Greening, Roxbury Russett, Seek-no-Further, Gilliflower and Talman (Sweet).

I find only seven of the above mentioned varieties on your premium list, thus showing the great changes that have taken place in the last 35 years.

Among the many valuable varieties found on your exhibition tables are some that deserve special mention:

York Imperial is perhaps one of the most profitable varieties grown in your State and also southward throughout the Blue Ridge and Appalachian region in Virginia, West Virginia and North Carolina. It also grows to perfection in the Middle West, where it finds a ready market in Chicago and other cities of the Mississippi Valley.



It may be of interest to note here that Pennsylvania has originated on her soil 285 varieties of apples of which York Imperial among the number. As most of you know, the tree was a chance seedling found by Mr. Johnson on his farm in York County; finding it to be of attractive color and a good keeper, he got Mr. Jonathan Jessop, a nurseryman, to propagate it. Mr. Jessop thought well of the variety and named it Johnson's Fine Winter. He sent a basket of the variety to the late A. J. Downing, who pronounced it "the imperial of late keepers," and as it originated in York County. Mr. Downing suggested the name of "York Imperial", an appropriate cognomen for this valuable commercial variety. It is now one of the leading varieties in many sections of the country where it brings large returns to the grower.

Mr. J. N. Craig of Rose Cliff Orchard at Waynesboro, Virginia, and Commissioner Coiner of the Department of Agriculture, Richmond, Va., report an orchard of York Imperial, ten years old, 4 acres, that yielded the comfortable return of $2,000 the past season.

The Stayman Winesap is one of the most promising varieties now being planted in commercial orchards. It has been found to succeed over a very wide area of country extending from the Atlantic to the Pacific. It originated in Kansas from where it spread first eastward and then westward. The tree is a vigorous grower, very productive of large fine fruit of good quality and it is justly entitled to the reputation it has gained.

Jonathan and Grimes Golden stand at the head of the list of choice varieties, especially for quality, for which they always command the highest market price.

There are several other varieties that might be mentioned that are well adapted to soil and climate conditions of many of the counties in Pennsylvania.

I fail to find any mention of Rome Beauty on your fruit lists. Just why you have omitted this is a question I cannot solve. In my estimation it should rank with York Imperial, and though not so prolific, it comes into bearing early and its quality is better than York Imperial; and it is the ideal apple tree for sandy soils.

The question of varieties to plant is one of paramount importance. In times past little attention was paid to this matter, but in recent years it has been the subject of very careful investigation. It was partly for this object that the American Pomological Society was organized. And for this purpose, by means of extensive correspondence with fruit growers all over the United States and Canada, data has been obtained upon which the Pomologist of the Department of Agriculture at Washington has been enabled to publish in pamphlet form, a list of varieties of fruit adapted to the various sections of the United States and Canada. It is known as the Revised Catalogue of Fruits and the publication is revised from time to time in order to keep pace with the progress in Pomological Investigations.

I cannot urge upon your growers too strongly the necessity of planting varieties adapted to your soil and climate. If mistakes are made in cultivation, spraying, pruning and such things, they can be corrected the folowing year, but if mistakes are made in the selection of varieties it means a loss of seven or eight years' time which no one can afford to lose in the short space of a life-time.

A mistake very often made is in planting too many varieties. Four or five of the very best sorts that have been tried and known to succeed in the locality where the planting is to be made, are sufficient for a commercial orchard.

According to the Census of 1900, Pennsylvania is one of the great apple-growing states, ranking third in total value of all kinds of fruits. It is probably safe to say that there is not a county in the State of Pennsylvania in which some kind of fruit cannot be grown with profit. It is needless to state here the different kinds of fruit that can be profitably grown in the different sections of Pennsylvania. You can decide better by what has succeeded best in any locality, what is likely to be the moneymaker in a given section. Since the Census of 1900 when Pennsylvania ranked second to New York in her apple crop, great changes have taken place, and more attention has been paid to up-to-date methods of orcharding.

A new interest in orchard growing has been awakened. Hitherto a large percentage of the fruit crop came from the home orchard or small commercial planting; now under the new impulse large plantations are being started and Pennsylvania is keeping pace with her sister States in the great movement, and her possibilities, it is safe to say, are unsurpassed by any of them, but

if she would keep up with the procession she must adopt the improved methods of the times, in all the details of culture, pruning, spraying, thinning, harvesting, grading, packing and marketing the fruit.

Intensive versus extensive culture is the watchword. Eternal viligance is the price of good fruit. The old method of planting an orchard and trusting to providence to take care of it is a thing of the past. Much depends on the man behind the enterprise. Success in fruit growing is not the result of chance or accident. It means the exercise of brain and muscle; it means business in every sense of the word.

However much you have done in fruit culture, recent statistics show that your orchardists fall far short of growing sufficient fruit to supply the great home demand, and large quantities are shipped in from other States. With this condition existing and with the wonderful possibilities of fruit growing in Pennsylvania, it seems to me that there never was a time in the history of the industry so favorable for orcharding as at the present, when viewing this subject from a commercial standpoint.

With the favorable climatic and soil conditions of Adams, Berks, Lehigh, Lancaster, Lebanon, Montgomery, York and other fruit growing counties of your State, and with such fine markets as Pittsburg, New York and Philadelphia right at your doors, there is every incentive to further the progress of fruit growing.

Next to the long list of apples that originated in Pennsylvania comes the list of pears consisting of fifty-two varieties of which the most valuable variety of all is the Seckel.

Your Horticultural Society is one of the oldest, having been organized in December, 1827; since then nearly all of the territory west of the Mississippi river has been settled and made into States whose populous cities teem with varied industries.

Your Society has on its roll of honor such names as Meehan, Landreth, Hoopes, Warder, Barry, Fox, Wilder, Parsons, Parry, Thomas and other distinguished pomologists, many of whom have passed to the Great Beyond. I would urge the young men of your State to take up the great work so ably begun by these illustrious pomologists for orcharding is a pleasant and profitable occupation.

To go back to the exhibit over here, I have not had time to make the notes I would like. My time was so taken up judging the fruit that I did not have the time to make the notes I wanted. In looking over the county displays, Perry, Adams and Luzerne have wonderful displays of almost perfect fruit—especially Adams. I trust you will pardon me if I make any personal allusions. Adams County makes the best display of any county. There is scarcely an imperfect speciment there in the way of the coddling moth.

Lewis Brothers, of Luzerne County, have one of the most remarkable exhibits in the hall. Every one can see the fruit for himself, and know what it is by the label. This exhibit was not in competition with the others, but it is a noteworthy exhibit.

In some of the exhibits I find the Spitzenberg, which used to be grown years ago, but has lately been dropped almost entirely. It is a high quality, and very valuable.

There are four boxes of apples over in the hall that come nearer perfection in grading and packing than anything else there.

I find some varieties that, perhaps, have not been tried, but of the tried varieties, there is the Rome Beauty, growing in many parts of the country. In Ohio, where it originated, it has become nearly perfection, and judging from the specimens I see over here, it will become one of the leading varieties of this state. Next comes the York Imperial.

By the way, I must not pass by a very fine exhibit of pears, sent in by your worthy President. He says it is due to cross-pollenation. That is something that has never been fully established before, but if this is the effect, it is something to know and make use of.

The Banana apple, which is coming into notice, originated in Indiana, from there into Michigan, and from there into the Northwest, seems to be doing as well here as out there. It is quite a choice variety, and I hope to hear further reports from it.

There is one thing that I wish to call your attention to in regard to the Jonathan. There is a disease which has lately shown itself in the way of spots on the skin; they are only skin deep, but is detracts from the market price of the apple. They do not know yet exactly what it is. The first time my attention was called to it was when a man came clear on to the city of Washington from the state of Washington. He had sent a carload of fruit there. It was sent by the way of Pittsburg and distributed through a commission house at Washington, and he received complaint of these spots, which it was supposed had developed while in storage. They showed me some of the specimens, and my impression was arsenical poison, which did not show itself at the time, but developed while the fruit was in cold storage. I find among your apples quite a number of specimens affected in this way.

Now, you are aware that there has been a tremendous impetus given to fruit-growing throughout the country. I think that Pennsylvania is to-day quite close up with other states. I have been watching this impetus, especially in connection with Virginia and West Virginia, and I suppose you, in your state, are doing the same thing. Now, I don't want to hurt your feelings any, as fruit growers, but I want to tell you that you have not yet attained to the high water mark in fruit growing. Now, if you will look over the display you will find a number of specimens that could have been improved by spraying, and you will find this, especially, in parts of the country where they have not had any education along this line. Then, in grading and packing you fall short. There is scarcely a box or a barrel on exhibition that would stand the test of the Hood River district. Out there they have specialists to do their packing. No man is allowed to do his own packing, so as to detract from the uniformity of the fruit. It is quite an art to pack fruit properly and carefully and nicely. Now, if you will go

over and look at the boxes there, and then at Lewis Bros. box, you will see the difference. Some of the boxes are not more than two-thirds full, and in no way can they come under the head of first-class packing.

Then there is another thing you will have to have your attention called to here. You spray for moth, and for the San Jose scale, but you do not prepare for frost. If you realize that the cold air settles at the bottom, you will have your orchards in such position that the cold air can escape without injuring your blossoms in the early spring. There is no telling what you may have to overcome in this matter of damage by frost. I have written out a few notes here, which, if you can spare me a little time, I will read:

Among the most wonderful achievements in the progress of horticulture in recent years is the discovery of means for the prevention of frost injury to fruit trees during and after the blossoming period. The danger to fruit trees by frost injury is not so great during winter months, but when the tender blossoms appear there are a few days in spring time when the weather is apt to be capricious.

It is perhaps safe to say that at least 40% of our crop of fruit is cut off annually in the spring of the year by frost. In some of the commercial orchard districts this disaster has occurred so frequently year after year that thousands of acres of orchard trees have been abandoned and are being cut down to give place to other crops. In this age of invention it is not wise to attempt to set bounds or limits to the ultimate power of man to overcome the forces of nature or to modify and change atmospheric conditions. There is little in the way of man's achievement that seems hopelessly impossible. Already it has been fully demonstrated that the temperature of the air can be raised a number of degrees by artificial means. Many devices for orchard heating have been invented and are now on the market.

From the abundance of testimony already obtained from reliable sources in all parts of the country, it is safe to say the prevention of frost injury to fruit crops has already passed the experimental stage and has become a well-established fact that cannot be controverted or lightly passed by. For the past three or four years practical tests have been made in Colorado and other western states, with perfect success. We have reports of many remarkable instances where thousands of dollars have been saved by the use of heaters. A single case in point will perhaps be sufficient. Mr. C. E. Mincer, of Hamburg, in reply to questions put by the Editor of the Missouri Fruit Grower in November, 1910, as to why he prepared for frost fighting, says:

> "We lost several crops of fruit by frost and we either had to save the fruit or get out of business. In one year, while experimenting with means to prevent frost losses, we saved 6,000 bushels of peaches by burning brush in the orchard, and another year we saved a part of the apple orchard by the same means. The success we had with

burning brush led us to equip a portion of our orchard containing 900 bearing apple trees with 1,000 of the small size Troutman orchard heaters. We also constructed a large storage tank that would hold several tank-car loads of oil and obtained an outfit of tank wagons, buckets, lighters, etc. The concrete storage tank is constructed of reinforced concrete and holds 16,000 gallons. The tank is all below ground and over the top is arched steel bedded in cement. An 18-inch man-hole is left in the top so that it may be entered at any time when necessary. The bottom of the tank slopes to one corner where it opens into a two-inch pipe that leads down hill to a point where easy loading in the wagons can be affected. The unloading of the tank car is done by gravity and by taking advantage of the slope of the land; the handling of the oil is also done by gravity when reloading the wagons. The oil is thus handled easily and quickly.

"The orchard pots or heaters must be managed so as to light quickly. We did not try to light the pots till the temperature dropped below thirty degrees. We did this to economize on oil. However, when the temperature reaches thirty-two degrees in any orchard, the oil pots should be lighted. And, if a period of 24 or 36 hours has elapsed after the trees have come into bloom the fertilization will probably be completed.

Records of Temperature. "The first night of the frost was April 16th. On this night the temperature was at 34 at 9 P. M. At midnight it had dropped to 27; at 3 A. M. it had reached 23 degrees and at 4 A. M. it reached the minimum close to 22 degrees. Inside of the orchard where the fires were burning, the temperature at this hour was 33 degrees in some places and 32 degrees in others. Outside of the orchards the temperature did not reach 32 degrees until noon the next day. On this night the wind was blowing so hard that it was difficult to pour the oil from the buckets into the pots. It must be poured into burning pots slowly or it will put out the fire. And to make the work doubly difficult on this night it was snowing hard and the melting snow in the pots caused the oil to sputter and pop from the pots, wasting a great deal of it.

"On Thursday night, April 21st, we had the most convincing test of the value of smudging with oil heaters. It was a clear night and still, and the temperature in the evening dropped to 28 degrees, reaching a minimum of 25, where it remained until 9 A. M. the next day. We lighted one-half the pots and watched results. A dense black smoke formed over the orchard and surrounding fields. The temperature outside of the orchard was 25 degrees and inside it was 36 degrees. Outside the orchard everything was covered with thick, white frost, while inside the trees were dripping wet with moisture.

In all we burned the oil pots nine nights, and the time ranged from five hours to twenty hours in each twenty-four. At the last the temperature would drop about four o'clock in the morning to freezing point and frost a little. We would light about one-third of the heaters and let them burn until past the danger time.

"The expense of heating the orchard this past spring was approximately 7 cents a bushel for the apples harvested. This includes the expense of equipment for the work, building the oil storage tank, the tank wagons, lighters, pots, buckets and enough ready oil on hand to fight another season of frost equally as bad. So that the actual cost the past season was far below the 7 cents mentioned.

"The cost of this protection is so cheap compared with the returns that it is absolutely folly for the fruit grower not to be prepared. The type of pot used was the Troutman, which was selected after much investigation from a number of sources, and we doubt if we could have made the successful fight with any other kind of oil burning pot."

There are thousands of acres of good orchard lands in your State and the awakened interest in fruit growing among your people will result in that sucessful orcharding that tends to make happy homes and increased revenue.

It is a great pleasure to me to meet with you and see what you have been doing along this line. I like to keep in touch with the fruit growers all over the country. Last week I was judging at the Ohio apple show, which, by the way, was a wonderful show. Last fall I was at Denver. As you know, that is one of the finest fruit-growing countries in the world, and fruit growing has become one of their most important interests. Some of the fruit I had to judge out there was what they call "jumble-packed." They put in a layer at the bottom, then put in the apples, with another layer on top. Every section has its own methods, but eventually they will all have to adopt the methods of the Northwest. The buyers demand it. I will give you an instance of this. A grower of Virginia who grew some very fine Winesaps, shipped some of them to New York, packed in boxes the same as they do in the Northwest and the dealer wrote him that if he had left his name off the box, he would have sold them for Northwestern fruit.

Now, I have said enough on this subject. I know the next time I come here I will find still further improvement in the growing of your fruit—in the spraying, in the pruning, but especially in the matter of grading and packing, which is one of the most important things. It is better to keep at home all your imperfect fruit. It detracts from the value of your fruit if sent to market. You, perhaps, think that all the Western fruit is like that you see here. It is not so. What we see here in the East is perhaps not one-half of their fruit, but they can not afford to pay freight on their imperfect fruit. You are 3,000 miles nearer the market than they are, and I think that going to the West is a step back-

wards. Within the last few weeks I have had three inquiries from Western men who want to sell out their fruit land and come East to raise fruit. They ask me where they can find a good location. There are still large sections here in the East, particularly in Virginia and West Virginia, that can be profitably used for fruit growing, and I suppose it will be so for some time.

The President.—We are indebted to Colonel Brackett for the very hard work he has been doing for us.

A Member.—I would like to ask the gentleman what it costs to heat an orchard?

Colonel Brackett.—Seven cents a bushel, with all the outfit; the next year, with your outfit already on hand, the cost will only be half as much—not more than two or three cents a bushel.

The President.—The members of the Pennsylvania State Horticultural Association have a very friendly feeling towards State College; in fact, we have begun to lean on it. I noticed Dr. Sparks, the President of State College, coming in a few minutes ago, and I want to ask him to say a few words to our Association.

Dr. Sparks.—Ladies and gentlemen who are interested in horticulture: I want, first of all, to congratulate you on your interesting meeting, and on the exhibit you are making here. I went in last night to view the exhibit, and I not only profited mentally, but I also profited so far as the Department of the Interior was concerned. The fruit there would certainly be a credit to the State of Washington.

Now, it has been said frequently, that many things are lost because the people do not go after them. That is something State College can never be accused of; we are going after things. Twenty-five years ago State College was known as a place where the boys and girls went and came away. The college is usually judged by what comes out of it. That is hardly fair, because it is impossible to take poor stock and make good stock out of it. You must have a good foundation to begin with. To-day State College stands for achievement, and nothing shows it better than the increase in value of property up there. To-day you people have about $2,000,000 worth of property at State College, and you are just beginning to find out about it. You want some interest on your invesment. In earlier days the father sent his boy to college because he expected to get some return from him; he did not always find it necessary to send the girl, and many sent neither the boy nor the girl. Now the boy and the girl have a right to the college, and if they cannot go to the college, why the college must go to them. So demonstrators have been sent out everywhere throughout the State to show the people the things that have been worked out at the College.

You people here are more interested in the development of fruit trees than anything else. The United States gives $30,000 each year to this state, every penny of which must be spent in agri-

cultural experiments. In working out how to get these experiments to you people, the old method used to be to issue bulletins (we still issue them), but usually the farmer put aside these bulletins to be read at his leisure in winter, and so did not have the principles to apply to his work in the summer; when the next summer came along, many of them had been forgotten. Now, the best thing is to come up to State College and get your education there, but for those who can not do that, the next best thing is to carry the experiments out to the people by actual demonstration. In order to do this, we must have money; money to take care of the six hundred boys and girls who come up to us at State College to learn the science of agriculture; money for the demonstrators who carry the college out to the people. Most of you have received this little leaflet which I hold in my hands; if you have not, it is not our fault, because we want you to have it badly enough. It simply tells what the college has done in the way of sending out bulletins, in the way of corn growing and judging contests, and in the way of personal demonstration. Three hundred addresses were delivered last year, reaching at least fifty thousand people. In addition to this, we have the short course, the Farmers' Week, and the correspondence course. In order to do these things, we must have money, and we expect to go before the Legislature and ask for an appropriation that will enable us to carry on these things. Your President should not have asked me to the platform if he did not want me to speak of these things and ask your co-operation. I am pleading for the college, and for the 1,750 boys and girls we have enrolled there this year, and also for means to enable us to bring the college out to you who cannot come up there. We are asking for an appropriation of at least a hundred thousand dollars to bring it out to you. If we can only save one life it is worth a hundred thousand dollars, and it is your college. I hope you will excuse the demand, and the earnestness of the demand from you, the people; it is your college, and we want you to do all you can do for your college; give us your best co-operation and assistance in the work that is being done for you.

The President.—I want the Chairman of the Fruit Show Committee to read the award of prizes. Will Prof. Wright please report.

Prof. W. J. Wright, Chairman, presented the following report of the award of the prizes:

CLASS I.—*Single Barrel.*

(1) Tyson Brothers, Flora Dale.

CLASS II.—*Three Barrels—Three Varieties.*

(1) William Stewart, Landisburg.

CLASS III.—*Single Box.*

(1) B. F. Wilson, Aspers; (2) Tyson Brothers, Flora Dale; (3) D. M. Wertz, Waynesboro.

CLASS IV.—*Three Boxes—Any One Variety.*

(1) Tyson Brothers, Flora Dale; (2) A. C. Richards, Shellsburg; (3) Daniel Rice, New Bloomfield.

CLASS V.—(*Pratt Cup Special*)—*Three Boxes of Three Varieties.*

(1) Tyson Brothers, Flora Dale; (2) Wm. Stewart, Landisburg.

CLASS VI.—*Single Plates.*

Arkansas (*Mammoth Black Twig*).—(1) D. M. Wertz, Waynesboro; (2) A. D. Strode, West Chester.

Baldwin—(1) L. M. Myres, Siddonsburg; (2) R. M. Eldon, Aspers; (3) Tyson Brothers, Flora Dale.

Ben Davis.—(1) D. G. Minter, Gettysburg; (2) S. L. Brinton, West Chester; (3) B. F. Wilson, Aspers.

Fameuse.—(1) E. F. Kaufman, York.

Gano.—(1) D. M. Wertz, Waynesboro.

Grimes.—(1) R. M. Eldon, Aspers; (2) D. M. Wertz, Waynesboro; (3) S. L. Brinton, West Chester.

Hubbardston.—(1) H. M. Keller, Gettysburg; (2) D. M. Wertz, Waynesboro; (3) A. C. Wright, Hummelstown.

Jonathan.—(1) D. M. Wertz, Waynesboro; (2) R. M. Eldon, Aspers; (3) A. C. Richards, Shellsburg.

Northern Spy.—(1) F. H. Fassett, Meshoppen; (2) J. C. Henning, N. Meehoopany; (3) H. B. Howe, Wellsboro.

Rambo (*Winter*).—(1) Wm. Stewart, Landisburg; (2) Rufus Lawver, Biglerville.

R. I. Greening.—(1) A. C. Richards, Shellsburg; (2) J. C. Henning, N. Mehoopany.

Roxbury.—(1) E. F. Kaufman, York.

Smokehouse.—(1) Wm. Stewart, Landisburg; (2) H. B. Cumbler, Logania; (3) E. F. Kaufman, York.

Stayman—(1) Tyson Brothers, Flora Dale; (2) L. M. Myres, Siddonsburg; (3) E. P. Garretson, Aspers.

Summer Rambo.—(1) Tyson Brothers, Flora Dale.

Tompkins King.—(1) A. C. Richards, Shellsburg; (2) H. B. Howe, Wellsboro.

Wagener.—(1) A. C. Richards, Shellsburg; (2) H. B. Howe, Wellsboro; (3) Wm. Stewart, Landisburg.

Winter Banana.—(1) Wm. Stewart, Landisburg; (2) H. M. Keller, Gettysburg; (3) G. E. Stein, East Prospect.

York Imperial.—(1) E. F. Kaufman, York; (2) Tyson Brothers, Flora Dale; (3) E. P. Garrettson, Aspers.

York Stripe.—(1) Wm. Stewart, Landisburg; (2) H. M. Keller, Gettysburg.

CLASS VII.—*Largest Number of Varieties.*

(1) H. C. Snavely, Cleona.

CLASS VIII.—*Collection—Three Plates.*

Ellwanger and Barry Special.—(1) Tyson Brothers, Flora Dale; (2) J. A. Cocklin, Siddonsburg; (3) Wm. Stewart, Landis-

CLASS IX.—*Collection—Three Plates.*

Edwin C. Tyson, Pruning Special.—(1) A. C. Wright, Hummelstown.

CLASS X.—*Collection for the Home Orchard.*

Edwin C. Tyson, Harvesting Special.—(1) S. L. Brinton, West Chester; (2) A. C. Richards, Shellsburg; (3) Wm. Stewart, Landisburg.

CLASS XI.—*Collection—Five Plates.*

(1) S. L. Brinton, West Chester; (2) A. C. Richards, Shellsburg; (3) J. A. Cocklin, Siddonsburg.

CLASS XII.—*Plate "Delicious" Apples.*

Stark Brothers Special.—(1) E. F. Kaufman, York.

CLASS XIII.—*Box—Jonathan Apples.*

Stark Brothers Special No. 2.—(1) A. C. Richards, Shellsburg.

CLASS XIV.—*Single Plate—Five Varieties.*

Friend Mfg. Co. Special.—(1) Tyson Brothers, Flora Dale; (2) B. F. Wilson, Aspers; (3) A. C. Richards, Shellsburg.

CLASS XVI.—*Nuts.*.

Section A (English Walnuts).—(1) J. G. Rush, West Willow; (2) Wm. Stewart, Landisburg; (3) L. C. Hall, Avonia.

Section B (Black Walnuts).—(1) Wm. Stewart, Landisburg; (2) J. W. Sheibley, Alinda.

Section E (Butternuts).—(1) J. W. Sheibley, Alinda.

CLASS XX.—*Sweepstakes.*

(1) Tyson Brothers; (2) Wm. Stewart; (3) A. C. Richards.

CLASS XXI.—*County Association Trophy.*

(1) Adams County; (2) Perry County.

The President.—It may be well to announce that at the close of this session there will be a "Good Roads" meeting right in this room, at which the Governor has consented to be present, and for which you are all invited to remain.

Mr. Engle.—After hearing this report, I move a vote of thanks to Colonel Brackett.

This motion was seconded and unanimously carried by a rising vote.

Col. Brackett.—It is very gratifying to me to see so many of you rise for that vote. I expected no such appreciation. I thank you.

Mr. Fox.—As one of the oldest members of the Society, I want to say that I think we are indebted to Col. Brackett for his work in judging the display. I don't think there is any one who has been a member of this Society longer than I have. I became a member in 1870, so that I am forty-one years a member. I am glad to see the young men come in and take such an active interest.

In regard to State College, we are glad to hear the earnest words of Dr. Sparks. In 1871 I first went to State College; I was a trustee for twelve years, under Dr. Atherton, together with our President, Mr. Hiester. Ten years ago we had hardly a single member from my own county of Berks. To-day we have forty-eight in the institution, and a number of alumnae, and the same reports are coming in from all over the state. It simply shows the impetus that is being given to fruit growing all over the state. A year ago I was with the Orchard Train for three weeks, through twenty counties of Pennsylvania, and we could see the awakening. At eighty meetings we had more than two thousand people turn out to meet this train. At one place, Selinsgrove, five hundred people stood all afternoon in the slush and rain. Then State College had its orchard train out, and to-morrow the "Goods Roads Train" will start. All these are bringing an education and an uplift to the people of this State.

I am certainly proud of this crowded room. I know the time when our friend Hiester and myself came to very slimly attended meetings, but we have now reached the stage where we are proud of having our friends from Ohio and New Jersey and New York and Connecticut come in to see us, and we are proud of our Association.

Mr. President.—Is Mr. Fassett in the room? We want to know why Wyoming has not sent a county exhibit to this meeting.

Mr. Fassett.—Mr President, Ladies and Gentlemen: I hardly know what excuse to give to the President and members of this Society.

I feel that the coming of the Association to our county last winter has conferred on the people a lasting benefit; the people of Wyoming County are doing things. We are growing fine apples even if we have no county exhibit here to-day. There are a number of exhibits here from Wyoming county, but no county exhibit. I want to say to you, however, that Wyoming County is coming to the front as an apple county; and I believe that the coming of the Society to Wyoming County last year is one of the things that is going to help to boost us in growing apples. Our County Association will meet at Tunkhannock next week and exchange views on apple growing, and at the next meeting of the State Society, I think Wyoming County will be a competitor of Adams County for the prize for county exhibits.

The President.—Mr. Fassett is excusable. He took the first prize for Northern Spy, and has been away doing Institute work, so he is excusable.

The Secretary.—Mr. President, I think we can excuse them because I can report as Secretary that Wyoming County has come up better with renewals than any other county.

The President.—That speaks well. If Mr. Zimmerman is in the room, we would like to know what they are doing out in Somerset County. I helped to organize that Society.

Mr. Zimmerman.—Mr. President, Ladies and Gentlemen: It gives me great pleasure to be able to meet with all the prominent apple growers of the State of Pennsylvania.

I didn't come here to make a speech; I am only a small grower, with fifteen or eighteen acres, but I am just beginning. We grew apples out in Somerset from the time of our grandfathers, but it is only in the last ten years that we have learned how to cultivate them, the same as many others here. I would rather grow apples in Pennsylvania than out in Washington or Oregon. There is no reason why we cannot grow better apples here than they grow out there. We have better soil, better climate, better markets—everything but a better color. Pennsylvania is a great apple state, and I don't believe it will be long before we will be shipping apples by the shipload or the trainload to foreign markets. We can't do that now simply because we have not got the apples.

I am here from Somerset County; we are taking a small, but active part. We are like the blossoms on the tree, just beginning, but I think we are willing to do our part in building up the State Association, and if you people will do your parts, we will try to help you along, so that we may become a community of apple growers and apple shippers, and make Pennsylvania all we can desire.

The President.—Now we would like to hear from Franklin County, the next neighbor to Adams County. Where is Mr. D. M. Wertz? Is there any one here to stand up for Franklin County?

Mr. Ledy.—Gentlemen, I am here to stand up for Franklin County.

The President.—Mr. Ledy, one of the largest peach and apple growers is ready to stand up for Franklin.

Mr. Ledy.—I just came into the room in time to hear you call for my friend and neighbor, Mr. D. M. Wertz. He was in the room a few minutes ago, but I think he has just gone out, but I am here as one of the standard-bearers of Franklin County. I believe that we have shown at Philadelphia, and are showing here at Harrisburg that the State of Pennsylvania can raise fruit that is infinitely better than anything the West can produce, and I believe we will be the peer of any State in the United States ere long. We are growing, up in the Cumberland Valley, a little better fruit than anywhere else in the state, and a little more of it. I am blowing my own horn, but you will have to excuse me. We are growing a

little better fruit than the other fellow, and a great deal better fruit than the Western fellow. Let us be united, and make Pennsylvania the Excelsior of the Union in fruit growing. We can do it. We have the natural conditions that will enable us to do this if we only use our brains and muscles, so let us do that.

Mr Black.—May I say another word? You called on Mr. Wertz a few minutes ago. I have in my possession a card of "D. Maurice Wertz, grower of peaches and apples" and I want to say that at the New Jersey meeting he came nearer scaring the New Jersey people than any other fellow there. He had some beautiful apples there, and the judges reported that they were sorry they could not give him a prize because he was out of the state. You need not be anxious about Franklin County if Mr. Wertz lives there.

WEDNESDAY EVENING, JANUARY 25, 1911.

The State Live Stock Breeders' Association, the State Dairy Union and the State Horticultural Association met in a joint banquet at the Lochiel Hotel. An attempt on the part of the hotel people to handle a crowd far beyond their capacity, resulted in delay and a very uncomfortable time in the dining room.

Toasts were responded to by Governor Tener as a guest and by representatives of the three associations in short speeches, full of force, each in his own way—and spicy. Thus what the occasion lacked in physical food was more than made up in the mental treat afforded.

THURSDAY, JANUARY 26, 9 A. M.

President Hiester in the Chair.

The President.—The first business this morning is the consideration of a new Constitution. Our Constitution, written thirty or forty years ago, does not seem to meet present conditions; we seem to have outgrown it. In the interval between the sessions, I appointed a committee to go over the Constitutions of other State societies, and pick out what they considered wise for our own use. Your Committee did their work, and drafted a plan which they presented at a joint meeting of this committee and the Executive Committee, and with a few changes it was approved by the Executive Committee. I will ask the Secretary to read the whole of the proposed new Constitution and then it can be acted on by the Society, as a whole, or section by section, as preferred.

The Secretary thereupon read the proposed new Constitution and By-Laws as a whole.

On motion, it was taken up section by section and fully discussed.

The matter of dues received special consideration. A few members feeling very seriously that the dues should be raised to three or even five dollars annual and twenty-five dollars life. Others were equally serious in feeling that the time was not ripe for a change in the dues.

A few minor changes were made and the Constitution and By-Laws printed in the early pages of this report were finally adopted.

The President.—The next thing in order is the appointment of a Nominating Committee.

The following gentlemen were named by the house, and the appointment confirmed by the President: D. E. Murray, W. J. Lewis, F. H. Fassett, E. B. Engle, Josiah W. Prickett, R. J. Walton and Abram Hostetler. Mr. Engle was made chairman.

ORCHARD MANAGEMENT.

By W. W. Farnsworth, *Waterville, Ohio.*

When I first began thinking of horticulture, and began to plan changing over from general farming to fruit growing, I was doing considerable work in the woods. I have always been a lover of trees, and a lover of the soil, and I realized that this new ground when the plow first went into it, was rich in humus, and when I compared it with the richest land I had for fruit growing, I saw the difference; I realized the difference, and I realized that it was due to the difference in humus. Then I read a pamphlet by Dr. Harlan on "Farming with Green Manures," and I began to look around me, and saw the farmers growing clover, without putting manure on the soil, and I soon found that soil to be more productive than other soils. Then I learned that the clover made the soil rich, made it darker and raised the temperature of the soil, putting in it the moisture and the humus, and the plant food that is so deficient in the old soils of our country. There is no pleasure in farming a poor soil. I have always been a humus crank, and am growing worse and worse from year to year. It seems to be a hopeless case. Probably the best I can do in my limited time, is to tell you of some of my work. I feel there that I am standing on solid ground.

I grow a general line of orchard crops—strawberries, cherries, currants, apples, pears, peaches, and plums, and I grow some of the ordinary farm crops, mostly as a feeder to my orchard. I also grow a great many small fruits and vegetables. We have been growing berries quite extensively. We find that we can keep a clean and healthy tree by cultivating the small fruits under it until the tree gets nearly to the bearing age. I have thousands of strawberries and currants growing in my orchards, and I find this a very satisfactory and profitable method.

Mr. Farnsworth's Young Orchard With Cover Crop.

The first thing is to get an orchard site that is free from frost damage. We want frost drainage. I am about twenty miles south of Lake Erie; then we have, again, the Valley of the Maumee River, which is thirty or forty feet lower than my farm, and these things seem to give us protection to a large extent, against the frost; in fact, we have been very free from frost, having but one severe loss from frost in the last twenty-three years.

Having selected the ground, the next step is to see that it is well underdrained. In my own case, we lay tiles three or four feet deep and 80 to 100 feet apart. Some people claim that good fruit soil should be naturally drained, but I have found the tile drainage to work very well in my peach orchards.

I like to start an orchard by using a hoed crop first. I put in a hoed crop, and then plant the orchard. I have been doing a good deal of fall planting, mostly apple, pear and plum; we are usually so busy in the spring that it is hard to get our tree planting done. Until lately, we have not been doing much with the one year old trees. My preference has been to get a two-year-old tree. Most of my orchards are planted twenty feet apart each way on the filler system, for which purpose I have used apples. I have a great many early varieties, and I prefer to use them in part. Some growers have been very successful with peaches, as a filler, but I have preferred not to mix my varieties, and have used the apples, chiefly of the early bearing varieties, such as the Yellow Transparent, Oldenburg, Jonathan or Rome Beauty, all of which do very well with us. You can hasten the bearing of these filler trees by proper methods. In the case of the apple, I like fall planting, and in spring planting I want to get them in just as early as possible after the ground is ready. After I have planted the tree in the fall, I top work it the following spring. I prefer the Northern Spy for a

stock and have used the Ben Davis. I always like to cut the scions in the early winter and keep them as nearly as possible in a dormant condition; in short, just as with anything else, don't let them get too wet or too dry. Then after the trees get well started, and the buds come out, we do our grafting, and we get better results by working this way. The general practice is to wait a year before doing any grafting, but I am satisfied that you lose time by it.

We start about 20 inches from the ground, and use a single scion. We shave off one corner in putting in the scion, and we get a good deal better results in healing over in this way.

Now, I have practiced it for fifteen years, and while I have no data to show that I have secured any better fruit by selection, I believe that I have gotten better results than if I had not practiced it. There are several things that go toward producing early bearing, but I believe this top working is one of them.

In the matter of pruning, my maxim is that pruning is a necessary evil. It is impossible to get a tree that does not require any pruning, but every limb that is cut off takes that much from the tree. I head my trees about 20 inches from the ground; the Rhode Island Greening we do start out a little higher, but our principle is to keep the trees down as low as possible, because with the present day implements, one can cultivate close enough. It may look a little better to cultivate to within an inch or two of the tree, but in a year or two it does not matter, and you are avoiding a large, high tree.

Then we plant in the orchard, potatoes or currants or strawberries. There are some objections to strawberries; the first year it is all right, but the second year they rob the orchard of some moisture. We seldom pick our strawberries over one year, and the latter part of June, the apple orchard is ready for cultivation.

The first four or five years we grow vegetables or small fruits. We take them out when the tree gets into bearing, and then we plow up the ground and grow cover crops. It is not safe to have any hard and fast rule; a good general must be able to change his plans over night. We use soy beans, or perhaps cow peas would do as well, but we use the soy beans, because we can cultivate by team, and they add humus to the soil. I know of some growers who allow the hogs to go into the orchard and gather up the soy beans, but my own practice has been to let the beans go to the ground, and turn them in. Then, I like crimson clover. We have one orchard, about eight years old, just coming into bearing; we got about a bushel per tree this last season. In this we have grown clover, leaving it mulched around the trees, and then the following spring, turned it in again. Another cover crop that we use very largely is the sand vetch. One objection to it is that its growth takes place in the spring, and thus prevents cultivation, and takes up the moisture that is required by the tree. The vetch, however, seems to take up an immense amount of moisture and retain it in the soil. It is better in this respect than the rye. Mr. Powell recommended crimson clover, but it is not so hardy with us as vetch. We find in cases where the vetch had been planted that we secured twenty

bushels more potatoes than where we had grown clover. We like to sow the vetch in July, to get the best results, although we have sown it as late as September, and still had good results. It lays quite low on the ground, and is very convenient to work around because it is not high, and it makes a wonderful growth.

Now, after the young tree has been shaped, we try to do just as little pruning as possible. I think we often delay the bearing time of our young orchards many years by unnecessary pruning of the horizontal limbs. I know, in my own young orchard, years ago, I explained to my foreman what I wanted done, and he said it didn't look right to him. I gave him permission to do as he thought best, but on my side, I carried out my theory, and in a few years, we saw the good results of it. We will have to be a little more sparing in our use of the knife. We will have to learn from our wiser friends. We are just in the kindergarten stage of fruit growing. A few years ago when the Western men began to ship in this fine fruit, and our orchards were attacked by the San Jose Scale, we became discouraged, but we find that we can grow just as fine fruit as they do in the West, and the Good Book says that "God gave man dominion," and that must include the San Jose Scale and everything else. In fact, it has been the best blessing we have had. It has been a little hard on the small grower, but it has put thousands of dollars in the pockets of the commercial grower. Let us spray more freely, and we will not have to do so much pruning. Of course, that does not apply to the peach trees, which need more pruning. The apple,, the pear and the plum need very little thinning. Many have said that the sour cherry needs but little thinning, but I find it needs about the same as the apple does. We do our pruning in the fall, winter or spring, any time after the leaves fall off.

In the manner of cultivation, we believe in early cultivation in the early life of the tree. In the second stage—the orchard may be divided into three distinct stages—it is when we grow cover crops we are growing fertility right there in the orchard, and the third stage, when the trees begin to occupy the ground completely, we depend on hauling in all the vegetable matter we can get—leaves, and straw, and manure or anything that will rot and become vegetable matter.

In regard to spraying, I hesitate a little to give you my methods of spraying, but I do so, to show you what can be done under favorable conditions. We have only been spraying twice a year. Perhaps you will say we don't get results, but as a statement of what we get, at the last Ohio show, the best we have had in Ohio, with a carload and a half of fruit on exhibition, we got thirty-nine prizes, thirty-six first and three second, out of forty-three exhibits. That was secured by spraying twice. Now, don't go home and do this, and lose your fruit, and then say I advised you to do so. We have been spraying for the past twenty-five years. We spray once, just before the blossoms come, with lime and sulphur, and then once when the blossoms fall. We reach the tree from four or five different sides. We never consider a tree sprayed until it is sprayed

from both sides, with the wind blowing that way, and we do thorough work. The Experiment Station did some thinning in my orchard, and Prof. Green said there was less than one half of one per cent. of sprayed fruit that showed any signs of any disease or worms. That was not because of two sprayings alone but because we have been spraying for twenty-five years. In the Southern part of the state they have Bitter Rot and must spray more, but we have not had any trouble with it in our part of the state.

The next thing I want to talk about is thinning. It is impossible to grow a high grade of fruit without thinning. You will have nubbins. Suppose you have a tree bearing a thousand apples; is it more work to pick five hundred apples in July and five hundred in October than to pick them all at one time? That tree will be in better shape and you will get a better price for your fruit by the two pickings.

When my orchards were beginning to come into bearing, I began to look around among the commission men. One of them told me he had bought fruit in one year from a hundred and ten orchards, paying an average price of $1.00 per barrel, but by the time the storage, the freight, and the commission, etc. were added, those apples must retail in winter to the consumer at $1.00 per bushel. The result was that when I started in the business, I put up my own storage house. Then I went to the leading grocers of the nearby towns and showed them my samples. Now I make it a point to have something a little better than the Ben Davis to offer I have never used the Ben Davis apple in my life, until last year I planted a thousand of them and top worked them. We arranged that I was to ship these apples on telephone orders, and then I said "we had better speak about the price." He said "you set your own price, and I will add a little profit to it for myself, and that will make the selling price." I have always set the price on everything that has gone out of my orchards. You want to be sure not to rob your customer the first time, and then he will come back. I have people come twenty and thirty miles in their automobiles to buy their fruit direct from the orchard. By dealing direct with the consumer, you can establish a very profitable and desirable class of trade. Our own home-grown fruit is always to be preferred to the Western fruit. Then, about the other side, why pay a dollar and a half to two and a half a bushel? Apples at a dollar a bushel are high enough to give us a splendid profit, and yet leave the fruit within reach of the average consumer who cannot afford to pay these exorbitant prices.

I have spoken principally about apple orchards, but many of the methods apply equally well to other fruits. With the cherry, our method is about the same, with the exception that we can start cultivation a little earlier. You hear about cherries and peaches wanting a thin soil. That is all nonesense. They must have a soil that will feed them, just the same as the other fruits. In the peach orchards, we attack the curculio by spraying when the spring comes, and we also spray for the plum rot, and in our orchards they have been practically overcome by spraying.

I think I have about covered the necessary points. When I see the progress we have made in gruit growing, I think the outlook is better than ever.

A Member.—How about your cold storage?

Mr. Farnsworth's Cold Storage House.

Mr. Farnsworth.—Thirty by forty, inside measurements, built of concrete blocks. Inside of that we have a two by two studding, with building paper, then another two by two with plaster. If building again I would prefer a double wall of concrete blocks. Then we have our ice boxes overhead. The apple room is 14 feet high; then above is our ice box about twelve feet wide and thirty feet long. We put the ice in before we put in the winter apples. The Grimes Golden is the first apple we put in. We drive right in with our fruit. We can keep it in fairly good condition. We have an outside packing room. We pack them ready for market in 20-pound baskets, with a little pink label, bearing our trade-mark—a four leaf clover, and that is the guarantee that the fruit is all right. We never have to solicit a customer. Our basket on the sidewalk makes all the announcements necessary. Most of our fruit goes to Toledo, fifteen miles distant, to which we have a splendid trolley service. These baskets would not do very well for long shipments, but for local shipments, we have no trouble with them.

A Member.—I would like to ask concerning the summer spray of lime sulphur and arsenate of lead. Do you combine them?

Mr. Farnsworth.—Yes, sir; a few years ago the chemists said we could not combine them, but we practical men have done so, and we find we get better results than by the use of either alone. It

mixes to a little sticky mixture, which we have no trouble in cleaning from the pipes by dipping them in vinegar.

A Member.—Tell us how you bring about early bearing.

Mr. Farnsworth.—Well, it is largely a matter of variety, and largely a matter of pruning—early pruning—and largely a matter of top working I think these are the three things that have the most influence.

Dr. Mayer.—Are your scions for top working taken from bearing trees?

Mr. Farnsworth.—Yes, sir.

A Member.—How can you use apples as a filler?

Mr. Farnsworth.—We plant our trees say forty feet apart, and put apples in between. Now, my system is generally this; if you are trying any new variety, by the time you have tested it, you can take out either the new or the old tree. Now suppose I put a Jonathan at each corner, and in the centre a filler of apple. This way I get twice as many trees as I need, and when I get ready to take them out, I can take out those that are not profitable. My plan is to try to keep my labor busy throughout the year. I would rather keep eight or ten men busy all the year round, than thirty or forty men for a few weeks. I begin my apple crop with the Yellow-Transparent. We keep stock largely to keep our men busy during the winter.

A Member.—About what time do you pick your Jonathan?

Mr. Farnsworth.—Until this year, we did not pick them until we picked the Baldwin. This year we picked them after the Grimes Golden, and the Greening. We never clean up with one pick; we pick our trees some twice, others more frequently. The red apples we pick three, four and even five times. Our Greenings we usually pick at one time, but I believe it would pay to go over it twice. I have one orchard that had a pretty liberal treatment of hen manure this year; one of the men lives near it, and he has a hen house right by the orchard, and you could tell the difference in those trees forty feet away. The fruit would not take on color, and was slow to mature. It got too much nitrogen. You can overdo it. That is the reason why I add acid phosphate to the stable manure when putting it out.

A Member.—Do you have much trouble with the mice in the straw mulch?

Mr. Farnsworth.—Yes, mice and fire are the two enemies of the mulch system. We bank up the soil around the trees.

A Member.—Do you find any bad results from the arsenate of lead?

Mr. Farnsworth.—No, sir.

A Member.—Will sour cherries do as a filler for apples?

Mr. Farnsworth.—I have never tried them. On general principles I don't like to mix two kinds of fruit. The spraying comes at different times. We might want to spray the apples when the sour cherries were nearly ripe, and it would not do.

Dr. Mayer.—I understand you to say you prune at all seasons. Now, in cutting the cherry, are you not troubled with gum or bleeding?

Mr. Farnsworth.—I would not cut off large limbs at any time. We grow only sour cherries.

A Member.—How do you market your sour cherries?

Mr. Farnsworth.—We use the quart measure, or boxes, like strawberries. That is largely a question of your market. I know people who use the grape basket. We put up some of our Jonathan apples in bushel boxes but most of them in baskets because that is what the general run of our customers want. I would always study the wishes of my customers, and try to meet them.

There is something that has occurred to me, and that is, that the Eastern districts are making a mistake in trying to copy the Western methods too much. I know that our Eastern fruits are much superior to the Western fruits in quality, and once the consumer finds the Eastern fruit on the market he will not take the Western. The trouble is that there is no distinguishing mark for the Eastern fruit; the customer goes to market, gets a box of Eastern fruit, and then goes back for more of the same kind, but because there is no distinguishing mark, he is just as apt to get Western fruit, which is not so good. Now, I believe that the Eastern grower should have some distinguishing method of packing and labeling his fruit, so that there can be no confusion. It has been suggested in our State Society that we adopt a little blue label, which can be procured from the Secretary, stating that if the contents of the package were found not satisfactory, to report to the Secretary and any member who was found guilty of misrepresentation would be refused the benefits of the label. I believe that our Eastern growers should devise some separate plan by which we can protect ourselves. We can grow as fine fruit as the Western growers, and put it on the market at one half the price, and if we have the quality, we can find the market, and we should protect ourselves.

A Member.—In planting trees, do you consider the question of pollenation?

Mr. Farnsworth.—I have never studied it because I plant a great many different varieties. If I were planting a big block of one kind, I would look into the question of pollenation. I find it of more advantage to have a greater variety in dealing with the local market than I would if I shipped in carload lots.

A Member.—What do you find the best package for the Yellow Transparent?

Mr. Farnsworth.—We use the twenty pound basket, because we do not ship any distance. Those of us who ship to the local market find it to advantage to have an early apple; for those who ship long distances, it does not matter so much.

A Member.—Do you use a wooden cover over the Yellow Transparent?

Mr. Farnsworth.—No; we simply put on the gauze. We do not ship over twenty or twenty-five bushels at one time, and so we do not stack them very much, and so far we have had no trouble with them, shipping this way. We are trying now to devise some little basket that will hold say half a dozen, with a wire handle, that can be taken home with the fruit. We want to create a demand for that kind of trade.

A Member.—How do you fasten the netting?

Mr. Farnsworth.—We simply use a dull knife and tuck it under the rim of the basket.

A Member.—Where do you get it in quantities, all ready for use?

Mr. Farnsworth.—Thompson & Co., Chicago, I think. Any of the larger dealers can supply you with the street and number.

A Member.—Can you tell what it costs?

Mr. Farnsworth.—Bushel size about $1.25 per 100; half bushel size about 80 cents.

A Member.—Do you ever plant field corn in between your trees?

Mr. Farnsworth.—Well, I have planted it, but I don't like it. I would much rather plant a low crop, beans or peas; we mostly plant potatoes.

A Member.—You might give us the kind of implement you use in cultivating.

Mr. Farnsworth.—In the spring, when the ground is a little heavy, we use the turning plow, but we depend mostly upon the

cutaway harrow, and follow this with the spring tooth harrow. We use a long bar so that we get close to the tree with one end, and keep the team away from the tree.

A Member.—Does saw-dust make a good mulch?

Mr. Farnsworth.—I doubt it; there is a large slat factory near us where we could get the sawdust practically for the hauling it way, but I have never thought it advisable to use it.

Just a word about cultivation; there are a number of orchardists in Ohio and New York at work on a gasoline tractor to run our harrows instead of horses and I believe it will prove to be a very satisfactory thing.

A Member.—How do you ever drive a furrow right up to the tree?

Mr. Farnsworth.—I don't always try. The best plan is to drive as close as you can safely and leave three or four feet of the tree to roots and mulch. It is very satisfactory; we get very good results that way.

A Member.—Does that seem to do well in growing peaches?

Mr. Farnsworth.—Well, I never cultivate too close to my trees in anything. I believe it is safer for the tree.

THURSDAY, JANUARY 26, 1.30 P. M.

President Heister in the Chair.

The President.—The meeting will please come to order. Is the Nominating Committee ready to report?

Mr. Engel.—Mr. President and members of the State Horticultural Association, your committee appointed to nominate officers for the coming year, begs leave to report the following names:

For President, Gabriel Hiester, Harrisburg.

For Vice-Presidents.—Hon. Wm. T. Creasy, Catawissa; Robert M. Elden, Aspers; F. H. Fassett, Meshoppen.

For Secretary, Chester J. Tyson, Flora Dale.

For Treasurer, Edwin W. Thomas, King of Prussia.

On motion this report was received and adopted.

Mr. Engle—I move that we elect the officers by ballot, and that the Secretary be authorized to cast the ballot of the Association.

This motion was properly seconded, and carried.

The Secretary, in accordance with these instructions, cast the ballot for the officers as nominated and they were declared elected.

LIME SULPHUR SPRAYS FOR THE SUMMER TREATMENT OF ORCHARDS.

By W. M. Scott and J. W. Roberts, *Bureau of Plant Industry, U. S. Department of Agriculture.*

(Presented by Mr. J. W. Roberts.)

Dilute Lime Sulphur Solutions for Apple Diseases.

The lime-sulphur preparations for the summer spraying of the apple have been developed not because Bordeaux mixture has not proved to be a good fungicide, but because it often injures both fruit and foliage to a very serious extent. On the fruit of many varieties the injuries caused by Bordeaux appear as russeted streaks or areas. Often, too, many of the apples are dwarfed or badly distorted. The applications made within three or four weeks after the blossoms fall are largely responsible for these injuries, which are particularly serious in a wet spring.

Midsummer or late spraying, such as that required for bitter rot, seldom russets the fruit since by that time the tissues of the skin have become more mature and are accordingly less tender. The skin of the young fruit is injured by the copper, the injured parts enlarging with the development of the apple and finally forming the familiar russet spots and streaks. In wet seasons russeting of fruit may be so serious as to reduce its market value 25% or even 50% in some cases.

Lime-sulphur preparations then, comprise the results of an attempt to find a summer spray of less causticity than Bordeaux mixture but possessing its fungicidal powers. During the past four years the Bureau of Plant Industry, and some of the experiment stations, have been conducting experiments with lime-sulphur fungicides and the results have been such as to warrant the recommendation of a dilute lime-sulphur solution as a partial substitute for Bordeaux mixture.

The Lime-Sulphur Sprays.

The lime-sulphur preparation used for summer spraying is but a weak modification of the old wash, long used as a dormant spray for scale and peach leaf curl. Concentrated lime-sulphur solution may be made at home by boiling lime and sulphur in water, or it may be purchased already made up, requiring then merely dilution to make it ready for use.

Home-made lime-sulphur solution to be used, when diluted, as a summer spray on apples, may be prepared as follows: Boil 16 pounds of sulphur and 8 pounds of lime with 10 gallons of water for about an hour, finishing with 8 gallons of concentrated solution. Then strain and dilute with water to make 200 gallons of spray. In each 50 gallons of spray there are 4 lbs of sulphur, which according to our experiments is about the right strength for apples during the growing season.

If it seems desirable to make it up in larger quantities 50 pounds of lime and 100 pounds of sulphur may be used with enough water to leave 50 gallons of concentrated solution when the boiling is done. For summer spraying two gallons of this solution should be added to 50 gallons of water. Lime-sulphur solution at this strength will control apple scab, leaf spot, and cedar rust fully as well as Bordeaux mixture and with injury which is very slight compared to that of Bordeaux.

For specific directions for the preparation of concentrated lime-sulphur at home, your own experiment station's bulletins by Prof. Stewart, contain the latest and best information. (Bulletin 99).

Fig. 1.—York Imperial tree sprayed with lime-sulphur, showing luxuriant foliage.

Numerous brands of commercial lime-sulphur for fungicidal and insecticidal uses are now to be found on the market. Most of these test 32° to 33° on the Baume spindle and for summer use on apples are to be used at a strength of 1½ gallons to 50 gallons of water. Such a dilution gives us about 4 pounds of sulphur to each 50 gallons of spray and is equivalent to the home-made solution diluted to the before mentioned summer strength. All of the commercial solutions, which we have used, gave fairly uniform results and compared favorably with the home-made solution. The chief difference between the home-made and commercial preparations seems to be in that while the former is much the cheaper, it is also the more troublesome.

Results of Experiments.

Experiments comparing the lime-sulphur preparations with Bordeaux mixture in the treatment of apple diseases have been conducted by the Bureau of Plant Industry in Virginia, Nebraska, Mis-

souri and Arkansas. Excepting bitter rot and blotch, all diseases of the fruit and foliage in all the experiments were as thoroughly controlled by the lime sulphur solution as by the Bordeax mixture. The lime-sulphur produced very little or no russeting of the fruit and no serious foliage injury while the Bordeaux injured both fruit and foliage of Ben Davis, Jonathan, Yellow Newtown, and some other varieties. The lime-sulphur sprayed fruit was invariably superior in appearance to that sprayed with Bordeaux.

Experiments for the control of apple scab on Winesap were conducted in Virginia during 1909 with the following results. On the plots sprayed with lime-sulphur solution less than one per cent. of the fruit was affected with scab; on that sprayed with Bordeaux mixture about two per cent. of the fruit was affected; and on the check or unsprayed plot thirty per cent. of the fruit was scabby.

During the same year similar experiments were conducted in Michigan with like results. The scab was held down to four per cent. of the crop by the lime-sulphur solution and to three and one-half per cent. by Bordeaux mixture, while eighty per cent of the unsprayed fruit of the same variety (Wagener) was affected.

Results of experiments conducted in Arkansas by the Department of Agriculture were not favorable to the lime-sulphur solution in the control of bitter rot and apple blotch. These two diseases were checked by the spray but not thoroughly controlled. There is therefore some doubt as to the efficiency of the lime-sulphur solution as a remedy for bitter rot and blotch.

In both the Virginia and the Michigan experiments the commercial lime-sulphur solution at a strength of 2 to 50 slightly scorched the leaves particularly on the terminal shoots, but this did not prove to be serious and at the end of the season the foliage was in good condition, the apple leaf-spot having been controlled and the cedar rust held in check. It was found also that arsenate of lead used with the lime-sulphur solution did not result in injury to fruit or foliage and that it controlled codling moth as thoroughly as when combined with Bordeaux mixture. A full account of these experiments was published in Circular No. 54 of the Bureau of Plant Industry.

Experiments of 1910.

During the past season experiments were conducted at Waynesboro, Virginia, on Winesap, York Imperial and Ben Davis. From 75 to 200 trees of each variety were sprayed and a check of about ten trees of each variety was left unsprayed. Each variety was divided into four plots and treated as follows:

Plot 1.—Commercial lime-sulphur solution, 1½ to 50 with 2 pounds arsenate of lead.

Plot 2.—Home-made lime-sulphur solution, 2 pounds of lime and 4 pounds of sulphur to 50 gallons of water, with 2 pounds arsenate of lead.

Plot 3.—Bordeaux mixture, 3 pounds bluestone and 4 pounds lime to 50 gallons water, with 2 pounds arsenate of lead.

Plot 4.—Check, not sprayed.

The Winesaps were sprayed, (1) after the cluster buds opened, just before they bloomed (April 5th); (2) as soon as the petals fell (April 19th); (3) three to four weeks later (May 17th); and (4) nine weeks after the petals fell (June 26th). The Ben Davis and York Imperial received only three treatments, the first application given the Winesaps having been omitted from these varieties, for the reason that in Virginia they do not suffer seriously from attacks of scab.

Lime-Sulphur Solution and Apple Scab.

In order to find the comparative efficiency of the sulphur and copper sprays for the control of apple scab, fruit from four Winesap trees in each plot and six check trees were sorted and the results are given in the following table:

TABLE I.

Lime-Sulphur Solution vs. Bordeaux for Apple Scab.

No. of Plot.	Spray Mixture Used.	Per Cent. of Scabby Fruit.
1.	Commercial lime-sulphur solution (1½ to 50) plus 2 pounds arsenate of lead,	2.2
2.	Home-boiled lime-sulphur solution (2-4-50) plus 2 pounds arsenate of lead,	6.1
3.	Bordeaux mixture (3-4-50) plus 2 pounds arsenate of lead,	6.2
4.	Check, not sprayed,	99.8

From this table it will be seen that the home-made lime-sulphur solution and the Bordeaux mixture both held the scab down to about six per cent of the crop, while practically all of the unsprayed fruit was scabby. The plot sprayed with the commercial solution had the lowest percentage of scabby fruit (2.2%) but this was probably due to a difference in the plots and not in the fungicides. Plot 1 contained medium-sized trees easily sprayed while the trees in plots 2 and 3 were large and rather difficult to spray with the outfit used.

It would appear from these results and those obtained in previous experiments that the efficiency of the lime-sulphur solution as a remedy for apple scab need be questioned no longer.

Effect on the Foliage.

Directly after the second spraying of the Ben Davis and Yorks, the foliage of these two varieties showed injury to a noticeable extent. This, however, was to be expected as the unusually cold and wet weather of April and May was particularly favorable to spray injury.

On the lime-sulphur plots the leaves of the young shoots were somewhat scorched about the margins, and as a consequence, some

of them were curled and distorted. Also on some leaves a few dead spots were to be seen and for a time it looked as though serious injury might ensue. The leaves, however, showed no further injury as the season advanced, even after the next aplication. By midsummer practically all evidence of injury had disappeared and during the remainder of the season the foliage was in excellent condition. There was no apparent difference between the foliage of trees sprayed with the commercial solution and those sprayed with the home-boiled.

The foliage injury caused by Bordeaux mixture was markedly greater than that caused by the lime-sulphur preparations and differed in that it became worse as the season advanced. The leaves were more or less spotted with circular brown areas and a considerable percentage of them turned yellow and dropped.

The trees sprayed with the lime-sulphur solution went through the season with much better foliage than those sprayed with Bordeaux mixture, showing the marked superiority of the former fungicide as a foliage spray.

FIG. 2.—Unsprayed York Imperial tree almost defoliated by leaf-spot, located in same orchard and photographed at same time as that shown in Fig. 1.

The apple leaf-spot disease was controlled equally well by both fungicides, but the lime-sulphur solution showed some superiority over Bordeaux in its tendency toward the control of cedar rust, a disease which seems to yield more readily to the sulphur than to the copper sprays.

Effect on the Fruit.

There was no appreciable difference between the lime-sulphur solution and Bordeaux mixture in the control of the diseases that occurred on the fruit. Apple scab, fruit spot and sooty blotch were controlled equally well by both fungicides. But particularly in

the case of the Ben Davis there was a decided difference in the appearance of the fruit sprayed with these two fungicides. The fruit sprayed with Bordeaux was considerably russeted although very little of it was dwarfed or distorted as often occurs with Bordeaux sprayed fruit. The Winesaps were also russeted though not so much so as the Ben Davis, while the Yorks showed only a slight roughening of the skin. The latter variety is almost immune to Bordeaux russet.

In all the varieties sprayed with the lime-sulphur solution the fruit was almost entirely free from spray russet. The natural russet at the stem end was enlarged slightly and on some specimens this ran over on to the side of the apple, but apples which were at all badly russeted were extremely rare. As a rule the fruit was smooth clean and highly colored; placing it in a grade higher than that sprayed with Bordeaux mixture which would mean twenty-five cents to fifty cents a barrel in price.

Fig. 3.—Apples sprayed with commercial lime-sulphur—Scabby fruit on the right.

Adoption of Lime-Sulphur in Virginia.

As a result of the experiments conducted in Virginia during 1909 by the Bureau of Plant Industry, practically all of the Virginia apple orchards were sprayed with the lime-sulphur solution during the past season. We personally examined some of these orchards and have had reports from many of them. In every case, so far as we have been able to ascertain, the results were satisfactory, both as to the control of diseases and as to the effect of the spray on fruit and foliage. In the early part of the season there was a number of reports of injury to the young leaves, but in no case did this prove to be serious. In the Yellow Newtown orchards where bitter-rot is a serious factor, the lime-sulphur solution was used in the early treatments for scab and leaf-spot, and this was followed by applications of Bordeaux for bitter-rot. This plan was entirely successful, the russeting of the fruit having been avoided and the bitter rot disease controlled.

Conclusions and Recommendations.

The evidence obtained from various experiments conducted by the U. S. Department of Agriculture, and several of the experiment stations seems to warrant the following conclusions:

Bordeaux mixture often russets the fruit and injures the foliage of many varieties of apples and its use in the early part of the season should, therefore, be avoided as much as possible.

Lime-sulphur solution, diluted so as to contain four pounds of sulphur in each fifty gallons of spray, is a good substitute for Bordeaux mixture in the treatment of apple scab and some other diseases, and will not materially russet the fruit nor injure the foliage. The concentrated solution may be purchased from the factory and diluted at the rate of 1½ gallons to 50 gallons of water, or it may be prepared at home.

Fig. 4.—Unsprayed apples—Scabby fruit on the right.

This fungicide will control apple scab, fruit spot, leaf-spot, and cedar rust, fully as well as Bordeaux mixture, but has not as yet proved to be as satisfactory for bitter rot. Where it is necessary to spray for this disease, the early lime-sulphur applications for scab may be followed at the proper time with Bordeaux for bitter rot, thus avoiding the russet and yet controlling the rot. There is also some doubt about the efficiency of lime-sulphur in controlling apple blotch and where this disease is bad Bordeaux should be used.

Arsenate of lead may be safely and successfully used in combination with the dilute lime-sulphur solution for the control of the codling moth and other insects.

The course of treatment best suited to orchards in Pennsylvania and adjacent districts may be outlined as follows:

Use the commercial lime-sulphur at a strength of 1½ gallons to 50 gallons of water, or an equivalent strength of the home-made preparation, with the addition of 2 lbs of arsenate of lead in each 50 gallons of spray. Spray the varieties subject to apple scab: (1) as soon as the buds have opened, just before blooming; (2) as soon as the petals fall, beginning when they are two-thirds off; (3) three to four weeks later; and (4) nine to ten weeks after the petals have been shed. The first application of this outline may be omitted from varieties that are not subject to serious scab infections.

Where it is necessary to spray for bitter rot the first three applications of Bordeaux mixture at intervals of two weeks, beginning about June 25th to July 1st.

In mild cases of apple blotch the lime-sulphur treatment would probably be sufficient; but in severe cases two or three applications of Bordeaux will be required; the first to take the place of the third in the above outline and the others to follow at intervals of two weeks.

Self-Boiled Lime-Sulphur Mixtures for Peach Diseases.

Owing to the susceptibility of peach foliage to injury by applications outlined above should be followed by two or three applications of fungicides, the peach grower has been practically powerless to combat the diseases affecting the fruit and foliage. The use of Bordeaux mixture has been frequently attempted and in some cases, especially in dry seasons, the results have been satisfactory, but as a rule the injury produced by this and other copper fungicides is so great as to prohibit their use on the peach.

The efforts of the United States Department of Agriculture during the past few years, to develop and perfect a satisfactory fungicide for use on the peach during the growing season, have been crowned with unusual success. We have found that a preparation known as the self-boiled lime-sulphur mixture can be safely and successfully used on the peach for the control of brown rot and scab or black-spot. The mixture when properly applied, controls these diseases almost completely and does not injure the fruit or foliage.

The experiments have been conducted in Georgia, Virginia, West Virginia, Arkansas, Missouri and Illinois, and in every case the treatment was successful. During the past year many fruit growers in Georgia, West Virginia, and other sections, sprayed their orchards with the mixture, and so far no adverse reports of results have been received. So far as it has been tried the treatment appears to have been universally successful in controlling both peach scab and brown rot.

Arsenate of lead may be added to the mixture for the control of the curculio, which not only produces wormy fruit, but increases the brown rot infections by puncturing the skin and opening the way for the fungus. The insect occurs in destructive numbers in nearly all eastern peach orchards and in most cases where spraying with the self-boiled lime-sulphur for scab and brown rot is done, arsenate of lead should be added.

Preparation of the Mixture.

To prepare self-boiled lime-sulphur, use 8 pounds of fresh stone lime and 8 pounds of sulphur to each 50 gallons of water. In order to get good action from the lime the mixture should be prepared in rather large quantities, say enough for at least 200 gallons at a time, making the formula 32-32-200. Place the lime in a barrel or tub

and pour on enough water to almost cover it, then all the sulphur. Stir thoroughly while the lime is slaking and add more water if necessary to make a creamy paste. Slaking of the lime and the stirring will make a good mechanical mixture of the sulphur and the lime, only a small percentage of the former going into the solution. As soon as the lime is thoroughly slacked more water should be added to stop further chemical action, as there is some danger of dissolving enough sulphur to injure peach foliage. The mixture is then ready to be strained and diluted for spraying.

Outline of Treatment.

For the treatment of peach brown rot and scab, in Pennsylvania and adjacent territory, the following is recommended: Spray the early varieties, like Carman, Hiley, and Champion, about a month after the petals fall and a month or six weeks before the fruit ripens. Later varieties, as the Elberta, Smock, Salway, and Bilyou, will usually require three applications for the best results; the first to be made a month after the petals fall, the second, three to four weeks later, and the third, a month to six weeks before the fruit ripens.

For the curculio, arsenate of lead at the rate of 2 pounds to each 50 gallons of self-boiled lime-sulphur should be used in the first application but not in the others. Where this insect is a serious factor, an application of arsenate of lead, 2 pounds to 50 gallons of water, with 2 or 3 pounds of lime, to be made a few days after the petals fall, is recommended, but is probably not often necessary in this section.

A Member.—I would like to ask whether the commercial ground sulphur is as good as the flowers of sulphur?

Mr Roberts.—It has given us just as good satisfaction.

A Member.—One word; what is the 2-4-50 formula?

Mr. Roberts.—Two of lime, 4 of sulphur, with a little water, boiled forty-five minutes, and then adding fifty gallons of water; if

A Member.—To what strength do you dilute the commercial lime-sulphur for peaches?

Mr. Roberts.—We used it 1-100; but got some injury, so that we do not recommend it.

Mr. Engle.—Would 1-150 prevent that and still do some good?

Mr. Roberts.—It is doubtful whether it would do any good. We have known it to burn at 1-200, and at that strength it is doubtful whether it would do any good in an orchard that is badly infected.

A Member.—Will the Japanese Plums stand the same strength that the peaches will?

Mr. Roberts.—I think so; the self-boiled lime-sulphur did not burn them.

A Member.—How long did you boil it?

Mr. Roberts.—As soon as you see red compounds begin to come to the top, you know it is time to stop. This takes about fifteen or twenty minutes.

A Member.—Have you been experimenting on the apple scab?

Mr. Roberts.—Well, we tried at one place with concentrated lime-sulphur 1-50, but the results were not such that we could be satisfied. The scab had not broken out sufficiently for us to be satisfied. We tried it in one orchard for foliage, and it controlled it very nicely.

A Member.—Have you made any effort to determine the origin of the peach yellows?

Mr. Roberts.—Well, one of the best men in the Department has been trying to do that, and if I could, my reputation would be made.

A Member.—Will there be any bulletins published showing the results of your 1910 experiments?

Mr. Roberts.—Yes, sir; very soon, and they may be secured by writing to the Department.

The President.—I see our Treasurer is now here, and we will have the Treasurer's report, if he is ready.

TREASURER'S REPORT FOR 1910.

Disbursements.

To Robert A. Smythe,	$46 80
To Gabriel Heister,	14 56
To J. G. Leighton,	8 15
To G. Dow Dewitt,	2 50
To Sebring & Co.,	11 38
To J. S. Briggs,	11 75
To H. F. Hershey,	13 52
To L. W. Arny,	13 52
To H. F. Thompson,	44 44
To John D. Herr,	40 27
To R. L. Watts,	12 52
To Chester J. Tyson,	104 44
To M. B. Waite,	20 75
To John F. Boyer,	10 11
To H. P. Gould,	17 65

To Lewis F. Walton,	3	10
To Frances N. Thorpe,	15	00
To Whitehead & Hoag Co.,	14	00
To J. P. Stewart,	10	63
To C. E. Myers,	5	28
To W. F. McSparran,	19	67
To B. J. Case,	16	89
To Publishing House of the United Evangelical Church,	37	58
To Mrs. D. M. Stewart,	75	00
To Gatchel & Manning,	9	00
To Edwin W. Thomas,	14	22
To The Sackett & Wilhelms Co.,	25	00
To Publishing House of the United Evangelical Church,	197	29
To Chester J. Tyson,	60	12
To balance, Cash on hand,	564	62
Total,		$1,439 76

Receipts.

Cash balance, January 11, 1910,	$74	51
Annual dues for 1910, collected at Tunkhannock,	29	00
Received January 15, 1910, State Appropriation,	500	00
Received from C. J. Tyson, annual dues collocted during 1910,	260	00
Received from C. J. Tyson, for S. Morris Jones, life member,	10	00
Received from C. J. Tyson, for Miss E. M. Sharp, life member,	10	00
Received from C. J. Tyson, for Geo. M. Wertz, life member,	10	00
Received from C. J. Tyson, for Sam'l C. Moon, life member,	10	00
Received from C. J. Tyson, for Robt. M. Eldon, life member,	10	00
Received from C. J. Tyson, for Thos. W. Barlow, life member,	10	00
Received from C. J. Tyson, balance from Phila. Exhibit,	9	25
Received December 23, 1910, State Appropriation,	500	00
Received annual dues for 1911 in advance,	7	00
Total,		$1,439 76

Harrisburg, Pa. January 25, 1911.

We, the undersigned, have examined the above Treasurer's account and find the same to be correct.

JOHN F. BOYER,
C. O. FINN,
T. C. FOSTER,
Auditors.

On motion this report was accepted as read.

PLUMS.

BY J. W. KERR, *Denton, Maryland.*

First: Can plums be grown in a commercial way in this state, with reasonable assurance of fair profit?

Second: If so, what as to adaptability of soils?

Third: Are there any special cultural operations, indispensable to the realization of the golden hopes of the planter?

Fourth: How decrease the errors, common in the selection of varieties?

Suppose a plat anywhere east of the Mississippi river, one hundred miles square, had a plum specialist at each single angle to solve these queries by the requirements of modern orchard management; as far as general principles would aid the answers would be branded with a similarity, suspicious because of the monotony. If the square is reduced to one-hundreth of this size, with an enthusiastic orchardist at each corner a comparison as to *details* would disclose a variety, rivaling that in the recorded and publicly expressed opinions of the Ben Davis apple.

The accomplishing of the absorbing and vital end, compels the utilization of means, unlike in kind and character, in the prompt control of emergencies, quite frequently and unexpectedly thrust upon the person in charge. No doubtful logic—no inconsistent hypotheses—no fragile assumption need be employed in making affirmative answer to query, No. 1. A far better, stronger and clearer proof than is possible by such means is the tanglible fact that in every county in this great commonwealth, plums are grown in a limited way, and in some instances by primitive means, for family use; this is common knowledge, and practically indicative as to the possibilities possessed by this fruit for market growing, as also reliably exemplifying the esteem in which it is held by the people.

The greatest plum puzzle I have seen, hails from a county in this state, where only slight and crude attention is given the plum, outside of what is necessary to provide sufficient fruit for family use; yet from this wholly unexpected source, where for years it has been the main dependence for such purpose, we have a variety, upon the botanical status of which the best authorities do not agree. Up to the present it remains a what-is-it, as relates to species. This digression is made simply to emphasize the important truth, that when plums are discussed from the stand point of a prescribed area, the merits of the fruit as a whole are generally underestimated. Now, if here and there on the farms and about the homes of the people in the different counties, this fruit grows well enough to afford a supply to such families, where in most instances the only attention given the trees is to gather the fruit from them, at all other seasons treated with cruel unconcern and superlative neglect; by what mental process will any other rational conclusion appear in the lime light of common sense, other than that for market purposes, the plum can be successfully grown in almost every county in this state, regardless of the variability of concomitant circumstances, as relates to soil and atmosphere? Comparatively, plums are little if any more perishable as a market commodity than peaches, though the general family consumption is more restricted, which is but a natural result of circumstances. That all of our smaller cities and larger towns offer profitable markets for much larger quantities of the fruit, than are now supplied, is neither fanaticism or sophistry, but an every day fact. Referring to the second query, soils as relates to their adaptation for especially desired purposes, are largely controllable by and amendable to intelligent ambition and the demands of necessity; for in many instances fine fruits are pro-

duced now, on soils which but a score of years back, a seriously expressed intention of their utilization for such purposes would have been ruled out by the admonition of prudence and the promptings of sound judgment; because of the apparent violation of the accepted teachings of nature. Nature itself, however, is not infallible. It is none the less a fact, that the nauseating stench of the sweat-shops stamps its deathly pallor on their inmates with no more certainty, than do the untreated and neglected conditions of unsuitable soils on tree and plant life. The exercising of good horse sense would promptly find a remedy in either case, the best soils in an agricultural sense are largely artificial, the degree of fertility and adaptiveness to profitable production in special lines, simply portrays in a broad sense, the intelligence and business qualities of the owner. Not every one distinguished by the honorable title of farmer, is an expert in soil renovation and improvement; neither is every one who plants an orchard expert in soil analysis. The common school of nature does in such cases accurately and distinctly blaze the trail for willing eyes to follow to needed improvement. Generous addition and discreet subtraction will with mathematical precision provide a balanced ration for the soil, and thus assure to it, both ability and inclination for liberal and kindly response to the wishes of its quarter master, who happily treading in wisdom's ways, has learned that tillage is more closely akin to irrigation than to manure, and that effective drainage is a "plumb" necessity.

Query number three if technically construed might imply that some special or unusual process, different in mode and measure from culture given to other fruits is essential with the plum, but the experience everywhere of successful growers thoroughly establishes the opposite; the practical sanity of profitable plum growing, while tolerant and forbearing, discloses a somewhat unyielding conviction, favorable to frequent surface stirring with such implements as are adapted to the character of the land. That is to say, often enough to protect it against waste either by useless weed growth or in moisture. The means employed to prevent the one, promotes the other. Present day fruit growing operations of the commercial class are notable for deeply interested vigilance and searching economy. Not the kind of economy that restricts needed cultural expenditure, and loses ten fold in the quality and quantity of the orchard products; the Book of Books warns against this type of economy in the parable of the talents. True economy in commercial fruit growing of any kind implies general investment for the needs of the trees, as discerned by kindly watchfulness, confirmed by good judgment and rendered effective by methodical application. No arbitrary code controls, nor ironclad rule regulates in the essential activities of brain and brawn, to forestall unfavorable weather influence; the intuition growing out of personal interest and experience is the surest reliance.

The fourth inquiry invites consideration of features, viewed collectively, are conspicuous in their instability; because of potent local influences, more especially climate and market. Atmospherical extremes as relates to temperature are more pronounced as

you recede from large bodies of water; inland situations while shorn of such ameliorating and softening influences in temperature, on the other hand, by the same conditions are to a larger extent free from excessive humidity—the foster mother of brown rot in the plum. The selection of varieties for a commercial orchard, is much like reading a sign-board that reads differently from different angles. Subsequent to the determination of a selection meeting the climate requirements, is the choosing from such selection, a list strictly in keeping with the demands of the market for which the fruit is intended. The fundamental or primary work in establishing an orchard is not a whit less important than in other business enterprises, and is more safely executed under the directions of the trinity of when, why and what, than that of heard, haste and hope. However profound the pomological knowledge of the planter—practical and thorough may be his judgment as to soil—suitableness of varieties as to climate and peculiarities of market, it very rarely occurs that a majority of the varieties found in his first orchard will be found in the second; actual test exposes in the most impressive manner a weakness or short coming in some particular that he fails to remedy. Experience of this kind in one or two instances does not conclusively establish that varieties thus condemned and barred by one planter, are unprofitable under the management of others.

Epitomised—the entire question as relates to profit, soil, culture, market, and varieties is largely under the effective control of one lever, the man.

In a review of the several species, or groups of plums as our authorities have classified them, for the purpose of selecting varieties most promising for a commercial orchard, it is wholly useless to include the Nigra group. Not because of any question as to hardiness of trees in withstanding low temperatures, but the thick, leathery skin of the fruit makes it undesirable in our markets. The same situation exists, to a great extent with the Americana group, though it contains a long list of varieties. For the west and northwest this group affords much greater assurance of crop production than any other, but with the exception of a very few varieties the fruit is met acceptable with Eastern consumers.

One of the most notable exceptions to this thick skinned feature is found in the variety named Hanson, which is the earliest in season of the kinds constituting this large group. The Stoddard is another variety which shows less of the politician in its skin than the average, and possesses that captivating merit of large size. There are quite a good many other kinds belonging to this group, that produce fruit of a large size, but in markets where buyers can choose, the plums with thinner skins are preferred.

The Miner group is somewhat of a pleasing modification of the Americanas as pertains to the skin, but is deficient to the same degree in the color of the fruit; and on this account is rather unattractive in the package. None of the varieties of this group are early in season. The "Domestica" group which embraces about all the old time garden plums including the Damson, Prune and Gage, shows in

its better varieties that much greater effort has been given to its improvement, than is evidenced by any of the native groups. It is still regretably patent that to make a selection of the Domesticas, for commercial orchard purposes, would be a very uncertain and lottery like transaction; though in several counties in this state, splendid fruit is occasionally produced from such varieties as Lincoln, Pond, etc. The Richland—a Berks County production, while not so large has vigor and productiveness of tree that gives it favor in some localities. Lombard is perhaps planted over a wider area than any other variety of this time honored group; it seems to adapt itself to varied localities more satisfactorily than most of the Domesticas. In quality it is quite variable—poor at all times, but worse some seasons than others. Generally this group offers no specially inviting promises to him who would grow plums for market. The care and skill necessary to grow the finer kinds make them too expensive to favorably compete with the attractive products of the Pacific coast. The many varieties of this group that were imported from Russia some years back, signally failed to fulfill the high hopes that many plum specialists entertained for them. They are rarely catalogued now by tree propagators.

The Triflora or Japanese group has assisted very materially in creating a more general interest in this beautiful and wholesome fruit. Fortunately the earliest importations of these contained one of the best varieties of the species—the Abundance. This variety deservedly holds first place in public esteem. Good color, size and quality, with a free growing, healthy handsome and productive tree; it is well equipped for the market orchard. The Chabot ripening two or three weeks later is another variety that has won favor with growers; while the fruit of this is in all respects equal to the Burbank, there is no comparison in the trees; the Chabot with its fine, vigorous upright habit in growth, while the limit is overleaped in slovenly, dowdy habit by the Burbank. The Red June another pure Japanese variety proves profitable for markets not too exacting as to quality; its early season and brilliant color usually secure profitable sale for it; the tree is a good grower, of good form, but compartively short-lived. These constitute the cream of this group and are about all that are worthy of much thought as commercial kinds.

Amongst the "Hybrids" there are a *few* profitable market sorts; the most promising one is the Sixweeks, a Texas product and clearly the earliest in season of any plum, worthy of attention by market growers. A rapid growing tree, forming a rather close head, that is regular in contour; an abundant bearer of bright colored fruit of full medium size; rather deficient in quality, but attractive to buyers, owing to its very early season and bright red coloring.

America is the only one of the many kinds from the Pacific coast that is sufficiently resistant to brown rot, to hold out a reasonable hope of fair profit as a market plum.

Gonzales, from Texas is superb in size and appearance, good enough in quality but not sufficiently resistant to Monilia or brown rot to warrant unqualified endorsement.

The Wayland group embraces some varieties that should be profitable to grow in most, if not *all* the counties of this state; the good citizens of which are generally graduates in gastronomy, and never dishonor their diplomas. Your tradition not only perpetuates, but promotes a liberal domestic provision of sweetmeats and table condiments, and this group of plums is unequalled in possibilities in that relation.

For preserving it is unexcelled; and for fruit butter (under the dexterous manipulation of the tactful kitchen queen) it affords a relish, unapproached in its appetizing fascination; for spicing these plums are in every particular, the peer of the best Damson. The trees, too, are not only pleasing to the eye, but distinctly and reliably productive. The Benson is a Nebraska variety, with fruit as large as any of the group, bright cherry red, handsome, and a little earlier in season than the other choice varieties of the group. Tree a very rapid grower with fine healthy foliage. Reed, a trifle later in ripening, but otherwise similar to Benson. The tree of this variety is notably pretty, clothed in showy, large, healthy, foliage; robust and stocky in growth. Wayland, still later in season and every way fine. While there are other good varieties in this group, this trio may safely be classed as the select. This class of plums are free from leaf-blight and black-knot—almost immune to injury by the curculio and brown rot and when well ripened are very acceptable for eating out of hand. Why not grow them for the markets?

The Wildgoose group has in many localities established its value for commercial planters, and at this day requires no certification of merit in its discussion, farther than an expression of preference as to varieties. Briefly stated—the Milton for early, followed by Wildgoose and Whitaker and finished up with the Mrs. Cleveland, give the planter the most profitable varieties of the group, for a commercial orchard, all of these kinds are very productive when properly pollinated.

It is a generally known fact that the kinds named in this group, whether planted separately or together will prove unsatisfactory in bearing. Yet the Simley, classed in this group—interspersed in such planting supplies at the right period effective pollen.

The Chicasaw group offers nothing to large, or market growers that would warrant their use in anyway, except as pollinators. For nearby or local markets, the Munson possesses merit; more on account of its size and early season than its quality. It is too soft for distant market. Newman is quite a productive variety and some seasons attains size large enough, but it keeps the grower guessing as to when he will finish picking them, as its fruit ripens over a long period. These two varieties are both, thoroughly reliable as effective pollinators for the Wildgoose type.

The several other species or groups contain nothing claiming attention in this paper. In conclusion, the likes, dislikes and predilection of the planter, will in a large measure determine the group best suited for him; and after settling upon such choice, varieties to fit the market he aims to supply, can be chosen with a minimum of uncertainity.

A Member.—May I ask Mr. Kerr whether it is any trouble to get the people to take the Benson in place of the old Damson?

Mr Kerr.—Well, it is like pulling teeth to make any intelligent housewife believe there is anything equal to the old Damson. It has been hammered into them with far greater force than Sabbath School teaching. It was quite a while before I could get my wife to believe it, but finally she became convinced. Once you succeed in getting people to try them there is no difficulty; one trial is sufficient. You plant one of these trees, and in ten years see the difference between it and the Damson. It is superior in foliage, in bloom and in fruit.

Prof. Surface.—What is the color of the fruit?

Mr. Kerr.—Red. The color is the same in all these varieties.

Prof. Surface.—What do you know about the Satsuma?

Mr. Kerr.—If I were to tell you what I really think of it, it would not sound very well. I planted three hundred of them, and they are an absolute fraud and failure in my climate, but I find some places down here and in the Northeast, where it is splendid.

A Member.—If you could raise the Japanese varieties successfully, would you raise any of the Wild Goose group?

Mr. Kerr.—Well, if I was raising them for money, I don't think I would raise any Japanese. In 1898—it sounds fishy, but it is absolutely true, although dangerous to talk about in public—I netted over $2,800 on three acres, a trifle over $900 an acre. I think you will agree that was doing fairly well.

Prof. Surface.—What about the German Prune?

Mr. Kerr.—No good with us; nothing in the Domestica group does well with us.

A Member.—In connection with the Japanese, will the Wild Goose bring as good a price?

Mr. Kerr.—More per acre; not as much per tree.

A Member.—The gentleman spoke of the tree pollenizing itself. I want to ask him what he thinks of a tree standing half a mile away from any other plum tree, as to whether it is necessary to have a plum tree, or plum trees of two or three varieties in order to have it pollenized? If this is the case why does a tree such as I have described, pollenize itself?

Mr. Kerr.—It takes a good deal of time to answer that. You take, for instance, the Keifer Pear; ordinarily it is very fertile, but

there are cases where the trees standing in the middle of the plot were less fertile than those that received their pollen from other sources. This is a large subject, and the most complete information that you could get is contained in a bulletin issued by the Department of Agriculture at Washington.

The Secretary read a letter from Prof. Symons of the Maryland Agricultural College relative to the "Simmons Bill" which provides for the quarantine and inspection of all imported plants and nursery stock.

The President.—This communication brings up a very important matter and I shall refer it to the Committee on Resolutions.

On the 21st of December last, there was formed at Washington, D. C., an association called "The Eastern Fruit Growers' Association," and we were asked to join it. It is intended to take in every state and county organization from Maine to Florida. Its object is chiefly to watch legislation at Washington, and help or hinder such legislation as may affect the fruit grower. I think the annual dues are five dollars for the Association and one dollar for an individual wishing to join. It is a proper move and I hope our people will take it up.

THURSDAY, JANUARY 26, 7.30 P. M.

President Hiester in the Chair.

The President.—The meeting will please come to order. The first thing on the program is the report of the Committee on Resolutions.

REPORT OF THE COMMITTEE ON RESOLUTIONS.

Your Committee on Resolutions begs to report as follows:

WHEREAS, We, the members of the State Horticultural Association assembled, believing that this has been one of the best meetings in the history of the organization, desire to express our appreciation to all who have in any way contributed to its success; therefore be it

Resolved, That we do hereby tender special thanks to the Committee of Arrangements and to the Chairman and members of the Exhibit Committee for their untiring efforts; to the representatives of the press, who have reported our proceedings; to the visiting speakers from a distance, who have rendered so much valuable service in the line of instruction, and especially to the Hon. G. B. Brackett, of the Department of Agriculture, Washington, D. C., for his highly satisfactory work in judging the fruit exhibit.

WHEREAS, The orchard experiments, as conducted by Prof. J. P. Stewart, of the Pennsylvania State College, promise results of very great value to the fruit growers of this state, be it

Resolved, That this Association express its appreciation of these investigations and urge their continuance as long as may be necessary to arrive at definite and positive conclusions.

WHEREAS, In view of the increasing interest in all horticultural lines and from our knowledge that the School of Horticulture at State College is laboring under great difficulties, for lack of room,

Resolved, That we urge upon our legislature the necessity of providing sufficient funds for the erection of a Horticultural Hall commensurate with the great industry in the State.

WHEREAS, We have been apprised of the fact that there are serious diseases of the honey bee, and that they are destroying this most useful insect to an alarming extent, in many counties of Pennsylvania, and

WHEREAS, This causes a serious loss in that industry known as "Bee-keeping," and also to fruit growing through a reduction in the number of bees needed to fertilize blossoms, therefore be it

Resolved, That we commend our Economic Zoologist, Prof. H. A. Surface, for his excellent work along this line and urge that our Legislature provide sufficient funds for continued investigations on this subject.

WHEREAS, Believing that a parcels post would serve a large public interest, through the development of its possibilities along the line of bringing the producers and consumers into closer relations, this Association declares itself as favoring the speedy enactment of such a law; therefore be it

Resolved, That the Association urge its members to continue in their efforts to secure its enactment.

Resolved, That we heartily endorse the "Good Roads" movement and do all in our power toward improving road conditions in Pennsylvania.

Resolved, That we heartily commend our Governor, the Hon. J. K. Tener, for the interest taken in our work, and the willingness on his part to use his influence and office for the betterment of our conditions.

WHEREAS, This Association has profited greatly by the special appropriation of $1,000 for two years, secured from the State through the efforts of our worthy Secretary of Agriculture, Hon. N. B. Critchfield, be it

Resolved, That we express our appreciation of this financial support, and request that at least a thousand dollars per annum be appropriated to the Association for the extension of the work.

Resolved, That we heartily endorse the bill now before Congress known as the "Simmons Bill," which provides for a national inspection of all imported trees and plants.

Resolved, That we highly commend and endorse the movement recently inaugurated in Washington, D. C., and known as "The Eastern Fruit Growers' Association."

WHEREAS, Believing a State Fair would be especially of great advantage in advancing the horticultural interests of the State, in brniging about each year a state exhibition of fruit, vegetables, flowers and plants, be it

Resolved, That we hereby express ourselves heartily in favor of the project.

Resolved, That we appreciate the importance, and heartily endorse the work accomplished by Prof. H. J. Wilder, of the Department of Soils, in connection with our State Experiment Station, and we respectfully request that our State Experiment Station use such influence as they deem proper to have Prof. Wilder continue the work for the ensuing year.

WHEREAS, Providence in His almighty wisdom, has removed from our ranks one of our honored members, an ex-Treasurer of this Association, Mr. J. Hibbard Bartram, of Chester County; also Mr. Samuel C. Moon, a life member from Bucks County, a well-known nurseryman and landscape gardener, also an ex-Treasurer, be it

Resolved, That this Association express its deep sense of loss and extend to the bereaved families, its sympathy.

(Signed)

F. H. FASSETT,
JOSIAH W. PRICKETT,
U. W. HARSHMAN,
ABRAM HOSTETLER,
S. L. BRINTON.

On motion this report was accepted.

Mr. D. S. Kloss.—There has been a wide work done in this State which I would like to recognize. I have therefore prepared this resolution:

Resolved, That we hereby endorse the excellent work of the Division of Zoology of the Department of Agriculture, in arousing an interest throughout Pennsylvania in the saving of the orchards of the State, the extensive planting of new orchards, and the production of perfect fruit, which work has been especially advanced by means of what has become known as "The Model Orchard Plan," as devised by Prof. H. A. Surface, State Zoologist, and ably carried out by his force of horticultural inspectors.

Resolved, That we hope that State Zoologist Surface will be given every encouragement in the continuance of the work by the members of this Association, and we wish him and his inspectors God-speed in their efforts to maintain Pennsylvania in its position as one of the foremost fruit-growing states of the Union.

Mr. W. E. Grove.—I move an amendment to this resolution: That we include the work done by the Department of Agriculture, under Secretary Critchfield, and co-workers; by the Pennsylvania State College and Experiment Station under President Sparks, Dean Hunt, Professors Watts, Agee, Wilder, Stewart, Wright, Gregg, Armsby, and co-workers and all other work being done in Pennsylvania in the interest of agriculture and horticulture.

On motion this resolution and amendment were duly carried in the regular way.

Mr. Fox.—These resolutions have been adopted, but there has been very little said about the death of two of our members, Mr. Bartram and Mr. Moon.

The President.—I will take the liberty of asking Mr. Fox to prepare a memorial of the death of these gentlemen. He is familiar with the circumstances.

Mr. Fox.—As a former secretary and one of the oldest members of the Association, and well acquainted with these two gentlemen, I shall be pleased to do so.

IN MEMORIAM.

By Cyrus T. Fox, *Reading, Pa.*

I would regret very much to have this part of the proceedings pass by without a further reference to the two deceased members of this Association, whose names have been mentioned in the report of the Committee on Resolutions. Each served as Treasurer of this Association, and rendered valuable services.

J. Hibbard Bartram.

J. Hibbard Bartram served longest in that office, and during his connection of many years with the Association was very faithful in his attendance. He was a zealous and successful fruit grower, and did much to advance the interests of horticulture in his part of the State. A native of Chester County, and a member of the Society of Friends, he came of distinguished horticultural stock. He was a lineal descendant of that John Bartram who was one of the earliest botanists of this country; after whom Bartram's Garden in Philadelphia, a wonderful collection of the trees and flora of America, located on the Schuylkill river in the southern section

of that great city, is named. The death of J. Hibbard Bartram occurred about the first of April of last year. He attended an Orchard Meeting shortly before, at which your speaker was present, and he then appeared to be in good health. He was a man greatly esteemed by his neighbors for his uprightness of character. He is survived by a widow, one son and one daughter. He was about 75 years of age.

Samuel C. Moon.

Samuel C. Moon was one of the most prominent nurserymen of this country, and was President of the Pennsylvania Nurserymen's Association for two years. He was a son of Mahlon Moon, the pioneer nurseryman of Bucks County, and was born on the old Moon homestead where he passed away. The nursery conducted by Mr. Moon has been in operation since 1848, and contains many rare plants and shrubs, including what is said to be the largest purple beech in the United States. He was likewise a naturalist of renown, having been one of the foremost members of the Delaware Valley Naturalists' Union.

As an illustration of his strict business ideas, it is related of him that, upon one occasion, George J. Gould, the railway and telegraph magnate and multi-millionaire, called at Mr. Moon's nursery one Sunday, and was given permission to inspect the grounds. Mr. Gould became enthusiastic over the magnificent specimens of shrubbery on the place, and expressed a desire to have duplicates of many of the choicest things he saw. He was ready to give an order, which in the aggregate would have run into thousands of dollars, but Mr. Moon declined considering it, "because it was the Lord's Day." A number of months elapsed before the order was renewed.

Mr. Moon was a member of the Orthodox branch of the Society of Friends, and for twenty years had been a member of the Board of Managers of the Westtown School, near West Chester, a Friends' institution. His death occurred after several days' illness on January 21, just a few days before the present annual meeting of this Association. Surviving him are his widow and one daughter, besides two brothers, William H. Moon (a former President of this Association) and James M. Moon.

PENNSYLVANIA APPLE SOILS.

By Prof. H. J. Wilder, *Bureau of Soils, Washington, D. C.*

Mr. Chairman, Ladies and Gentlemen: There are many localities in the State of Pennsylvania that are well adapted to apple growing, and it is to the leading growers of such localtiies that the State owes the existence of this organization. Now, those sections of the State already developed are fairly well known, and it is my purpose at this time to invite your attention to such portions as have not been so well developed. I will say right here, however,

that we would not have to go very many miles from where we are now to find plenty of undeveloped fruit soil as good as any already planted, that may still be had at very reasonable prices.

Nine years ago your President prepared a bulletin for the State Department of Agriculture on "Varieties of Fruits That May be Successfully Grown in the State of Pennsylvania," and I may take occasion at this time to call your attention to the particular excellence of that work in serving the horticultural interests of Pennsylvania.

I will ask you to start with me on an imaginary trip from here to Northeastern Pennsylvania. The map on the wall has been prepared to show some of the principal soil boundaries. The yellow color represents the South Mountain range. The Blue Mountain, or North Mountain, is here shown by the blue belt extending from near Belvidere on the Delaware River southwest to the Maryland line.

A Row in Mr. H. C. Snavely's Orchard, Lebanon County, on Hagerstown Clay Loam.

South Mountain and its adjacent slopes are well adapted to fruit growing, as most of you know. Pennsylvania owes, in fact, a great deal of her fruit growing reputation to that region, and I may add that it is truly astonishing that the prices of good fruit lands in this state are so low as they are, even in the South Mountain region.

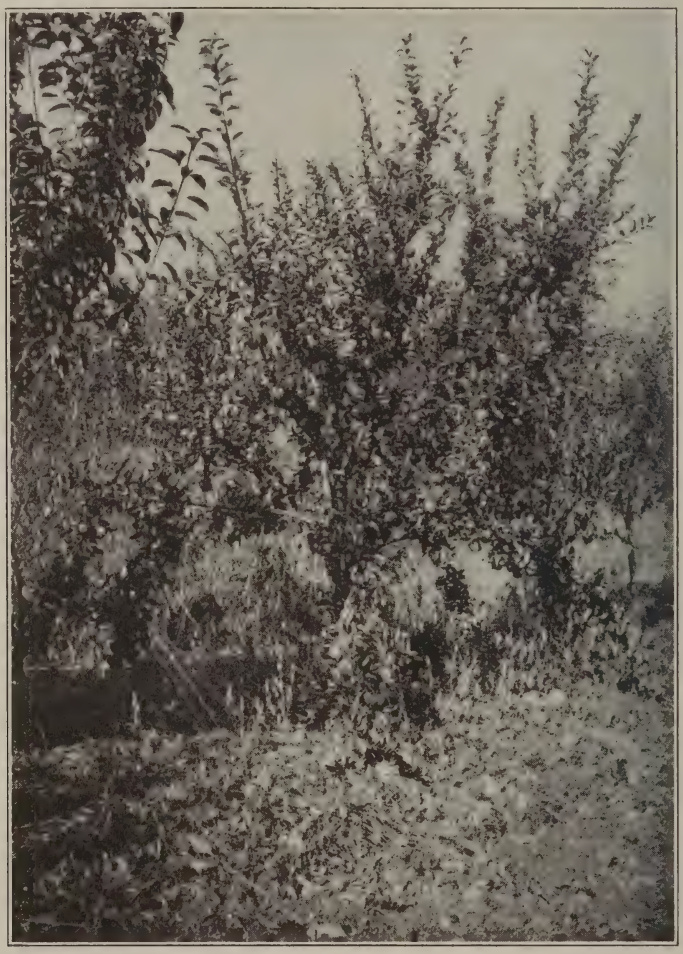
Just east of the Allegheny Mountain, or the Allegheny Front as it is often called, is outlined the "Appalachian Mountains and Valleys Region" which extends in cross-section southeastward from the Allegheny Front to Blue Mountains, and lengthwise from the Delaware River southwest to the state of Maryland. Its width in Maryland is practically the distance between Cumberland and Hagerstown, the latter town being in the limestone valley just to the

east. Along the Delaware River the same broad belt extends from near the Water Gap to the northeast corner of the State. This section is a part of the great Appalachian Mountain System which becomes much higher in elevation in the Southern states. The region consists of a series of elevations and narrow valleys just like this (holding up fingers). Now, the slopes of these hills are adapted, in some cases, to profitable orchard planting, though on the other hand, many of these hills are not very productive. There are three distinct classes of soils to be found there: First are those soils derived from yellow and brown shales and sandstones which are called the Dekalb soils; second the Upshur soils which come from red shales and thin-bedded sandstones of the same color; and lastly the Hagerstown, or limestone, soils which occur in some of the valleys. In this section of the State there are many suitable locations for orchard planting, but they should be selected with care as to the character of the soil, and to the air and water drainage. The prices for land are so exceedingly moderate that it seems unnecessary for any Pennsylvanian to go out of his own State to grow fruit. The old Juniata peach belt, once famed for its excellent product, is in this region, and although it suffered severely from the ravages of disease it still possesses some good orchards, and is certain to see many apple orchards planted, and at least some peaches, notwithstanding the yellows. Why was this famous peach belt first developed? Simply because some fellow living there once made up his mind to grow fruit, and his efforts were rewarded with some degree of success. It is only human to think that whatever my neighbor does I too can do, and the result in that locality was that most everybody tried the peach business and it was this fact that led in some measure at least to the great number of failures. The striking illustration which the old Juniata peach belt affords is its contrast to other districts not far from it that are just as well adapted to peach orcharding, yet have never been developed. Land prices are still very low in this whole region.

Going northeastward to the region around Wilkes-Barre similar topographic conditions are found. I spoke a moment ago of the series of ridges crossing the State from the northeast to southwest. This green line (pointing) was put there to indicate the southern extension of the glacier which is supposed to have come down from the North spreading over the hills and valleys to this line. The soil and rock debris left by the glacier gives rise to the Volusia series of soils. Where the layer is so very thin that it has been of less influence in forming the present soils than the original materials over which it passed, the soils have been separated and mapped as the Warren series; and again, where underlaying red shale was ground up so fine by glacial action, or where the glacier left an overdeposit of red soils deep enough to determine the character of the surface materials, the Lackawanna soil series was mapped, being named for Lackawanna County where it was first found.

In northwest Pennsylvania other areas of the Warren soils occur in Crawford and Warren counties, in fact the series name was taken from that of the latter county. Northeastern Pennsyl-

vania, it seems to me, possesses wonderfully good opportunities for orcharding at the present time. I was deeply interested in finding how cheap good orchard land can be purchased in that section of the state. Thirty, forty, fifty dollars an acre, and sometimes even less than that, will buy excellent orchard land in that region within



Nine-Year-Old Wagener on Lackawanna Silt Loam.

a few miles—frequently not more than ten, and very often not more than five—of the Wyoming Valley markets, which are among the best in the United States. You all know that the coal town markets, whether located in the anthracite or the soft coal regions, are wonderfully good. And even if the commercial orchards should be developed to such extent that these local markets could not take all their products, they are within a short distance from New York and other eastern cities with an aggregate population of many mil-

lions of people. This is where the winter varieties can be grown to marked advantage. The Northern Spy, Bellfleur, Baldwin, Stark, Rhode Island Greening and many other excellent varieties can be grown profitably in this region. I will not take the time to enumerate many varieties, but the Northern Spy interplanted with Wagener, which also does remarkably well there makes a very effective combination. There are men from that section attending the meetings here this week who own orchards that the Wagener has paid for by the time the Northern Spy came into bearing. One other advantage that district has in growing the Northern Spy is that it comes into bearing sooner after planting than in most sections of New York, in fact it will average to bear in the Wyoming Valley region three years earlier than in Connecticut or New York. Now, this is a remarkable advantage which the state possesses, and there is perhaps no apple of finer quality than Northern Spy when well grown. Besides the Wagener there are other early bearing sorts that have given excellent results as fillers, especially the Wealthy and Oldenburg.

I want to say just here—though it is somewhat of a break in the subject—that at the Lancaster meeting a few years ago I said that the Baldwin and Spy would not do their best on the same kind of soil, that a light soil brought the best results with the former variety and that a soil somewhat heavier was preferable for the Spy. Some one attending got the idea from what I said that neither of these varieties could be grown with any degree of success on any other kind of soil than the ideal described. Now, I hope I did not present the subject in quite so obscure a manner as that, in fact I am sure the records do not so state, but if anyone else did get that idea from anything I said I want to correct it. My idea is that within a given set of climatic conditions there is an ideal in soils for certain varieties and that in orchard planting we should aim to select those soils that come nearest the ideal conditions for the different varieties. If the best possible soil for each variety is not available the trees should be planted on the soil that comes nearest the ideal, and one should always work with that end in view.

In the central northern part of the State (indicating on the map the following counties: Warren, Forest, McKean, Elk, Cameron, Venango, and northern Clearfield, Jefferson and Clarion) the conditions are quite different. The altitude is high—say 1600 to 2200 feet, or possibly 2500 feet—and the soils are quite different. The region has not been glaciated at all, and the sandy types of mountain soils predominate. The district is not generally so well adapted to orcharding as some others, though good soil locations may readily be found. There is a good deal of waste land, but the prices are such that one can afford to have some waste land—from $3.00 an acre up. Well improved land including buildings may be had at $30 to $40 an acre.

In the southwestern part of the State we have three series of industry has been developed, and here in Mercer, Lawrence, Crawford and southern Erie counties the glacier has passed, forming another important area of Volusia soils where orchards can be grown

successfully. Land prices are slightly higher than in the last district described but still they are only forty to fifty dollars an acre, with sixty dollars for very good improved land with good buildings. Just to the south are excellent markets, although not so remarkable as the coal markets of the northeastern part of the State. In many localities within this region there are splendid opportunities to grow special crops. One of the cases I have in mind is that of a young man from one of these towns who came to me up at State College the other day and said he wanted to grow fruit. His father is a fruit dealer but he said, "I don't believe I am worth as much to the business in town as I am on a farm not far distant which my father owns, and I would rather develop the farm. Similar cases are not infrequent at the present time. Near Pittsburg special crops can be grown to advantage for that market.

In the sopthwestern part of the State we have three series of soils: The DeKalk previously mentioned; the Brooke series, derived from limestones but still very different from the Hagerstown soils that come from the limestone of southeast and central Pennsylvania; and the Westmoreland soils which come from a mixture of shale and limestone, making very good soils. If it were not for the injury from coke smoke these should be very productive soils.

Now, I have gone over this map upon which are indicted only the broad divisions of soils very hurriedly and will not take any more time in a general description of soil conditions unless there are some questions. Considering the present prices of land and soil conditions, there are three forms of orcharding that may well be developed with profit. First, the commercial orchard—and there are two ways to work along this line,—one, by the extensive method, and the other by the intensive. The goal of the first is to produce a large number of carloads, but with the other the quality of the fruit is the first desideratum, the quantity the second. The first means more acres, the other more salable fruit per acre. I believe the most profitable type of commercial development is a combination of these two forms. One may hardly plant too large an acreage until the point is reached where excellent care is sacrificed in some measure, owing to the large extent of the orchards. This will vary much with circumstances, but I believe it is very easy for a man to plant so large an acreage that he is compelled to neglect some of the finer points of the business, even from the strictly commercial viewpoint; and there is a question as to where this point comes—where the individual acreage should stop. In planting, the character of the market must be taken into consideration, and those who adopt Mr. Farnsworth's idea of growing for a special market must include varieties that ripen during a long season, from early to late. This particular method of intensive growing is coming to have more and more influence on orchard development.

Then there is the farm orchard. I am enthusiastic enough about the commercial orchard but we must not forget the farm orchard which, in fact, is responsible for the high rank Pennsylvania has held in the apple industry for the last half century. A

Pennsylvania R. R. official was asked by a New York apple buyer to direct him to two or three towns in this State where he could get a few carloads of certain kinds of apples. The railroad official told him of several towns in the Appalachian district of the State. The New York man went to that region but could not find any apples. In one town he rode around all day without success. Finally he went back to New York without having found any apples and sat down and wrote a somewhat sarcastic letter to the Pennsylvania official. It was for the Pennsylvania official to make good so he wrote him to come again, but in the meantime to put an advertisement in the local papers saying he would be in that town on a certain day to buy apples. He did so, and the railroad man took the trip with him. One car had been ordered and it was not long before it was filled, and still the farmers came in with wagon load after wagon load of apples. Another car was wired for, and still another, and as I recall, it was six cars that were filled—all the product of the old home orchards. Pennsylvania has done much with these farm orchards in the past and I believe she will continue to do so in the future. I want to make a special plea for the ten-acre orchard on the dairy farm and the general crop farm. There are thousands of farmers in the State to whom the planting of such an orchard should mean much because its care fits in well with other farming operations, and it serves as a profitable money crop.

In closing I would like to call your attention to four things. First, the wide range in this state of soils and of climatic conditions that are suited to commercial and less extensive forms of orcharding. Second, the long list of varieties high in quality that are now grown with profit—you need not worry at all about the quality you will be able to produce if you select the varieties that can be grown to advantage in your soil and climate. Third, cheap land—so cheap, in fact, that it may be found not far from any particular neighborhood where one wishes to live. Fourth, the best markets in the United States are nearby. A more complete combination of circumstances conducive to success cannot be found anywhere, and it seems to me that the prospects of extensive tree planting in this State are excellent.

A Member.—About the soil from Sunbury to Wilkes-Barre, what particular soil do you find there on the bluffs?

Prof Wilder.—From Sunbury to Nescopeck the yellow Dekalb, and the red Upshur soils. Thence to Wilkes-Barre the Volusia and the Warren soils. All these soil series contain good orchard sites.

A Member.—You do not say much about the limestone soil.

Prof. Wilder.—No; I said I was going to leave out southeastern Pennsylvania because it was pretty well developed. What particular location of limestone soils do you refer to?

A Member.—None in particular; I was simply interested in a general way, particularly in the Cumberland Valley.

Prof. Wilder.—The Hagerstown or limestone soils there will grow apples very well where the elevation is fairly good. Some of the limestone areas have insufficient elevation for the best results, and some of the soils are rather heavy, but otherwise they should give good results. Other good apple soils may be bought more cheaply, but if one already has these soils he need not hesitate to plant. The so-called pine lands, occurring between the limestone soils there and South Mountain, are very promising.

A Member.—Bedford County?

Prof. Wilder.—You can find there every kind of soil I have described for the Applachian Mountain and Valley region. There is a good opportunity there for orcharding.

A Member.—How about the northern part of Cambria?

Prof. Wilder.—Most of it is Dekalb soil, and you can grow there most of the New York or winter varieties. These soils are not generally as productive as some of the other soils, consequently it may cost you a little more to bring them to a productive condition but that is not difficult if suitable cover crops are grown.

A Member.—How about the limestone land at the foot of the Allegheny Mountain?

Prof. Wilder.—I will give you the same answer I gave to this gentleman over here in regard to similar soils in the Cumberland Valley. They are all right where the local air drainage is good.

A Member.—How is northern Bucks?

Prof. Wilder.—I have not been over it thoroughly, so I can answer only in a general way. Good orchard soils occur there but some of the blue shale soils south of Blue Mountain are poorly drained and very shallow. They are often marked by a scrubby growth of cedar from 3 to 6 or 8 feet high. It is well to avoid that soil.

Mr. Walton.—Professor, you have said very little about the southeastern portions of the state east of the Blue Ridge.

Prof. Wilder.—Between Blue Mountain and the Cumberland-Lebanon- Lehigh Valley and extending from Delaware Water Gap to the Maryland line there is a broad area of the Berks series of soils, the shale loam and the silt loam being the predominating types. These soils have not been developed in fruit as their worth warrants. The valley mentioned is occupied principally by the Hagerstown or

limestone soils, but it also includes many important areas of the Berks soils in the more rolling portions. Below the valley is South Mountain on which the Porters soils, the Mont Alto soils and the stony types of the Chester series are most extensive. All of these soil series include excellent fruit soils some of which are still for sale at very reasonable prices. Below South Mountain are important areas of the Penn soils—the red sandstone and shale soils of the Piedmont section, which may be contrasted with the red sandstone and shale soils of central Pennsylvania at much higher elevations, already referred to as the Upshur series. Interspersed with the red Penn soils are large areas of brown Chester soils derived from hard or granitic rocks. So well developed are these in Chester County that they were given the name of that county. Broadly speaking the Penn soils are fully as well adapted to peaches as to apples, while the opposite is true of the excellent Chester series. Some of the Brandywine soils in southern Chester, Lancaster and York counties are also moderately good but they are not quite as productive as the Chester. The Manor soils (white and red slate) are less desirable.

Mr. Walton.—Now if any one were to ask you what portion of the State to go to plant a commercial orchard, what would you say?

Prof. Wilder.—I would dodge every time. To save a few of my friendships I think I would ask him where he lived, and then call to his attention the best conditions in his own locality. If one wished to grow certain varieties or wished to cater to certain markets, then definite recommendations could well be made to suit the individual conditions. In the confusion of questions a moment ago someone asked about Monroe County, which contains considerable amounts of land too rough for profitable development on account of competition with smoother areas which are also low in price. This leaves Monroe County with a lower average of soil adapted to orcharding than some other counties, but nevertheless it is not at all difficult to find many good locations there.

A Member.—How about the soil I asked about on the east side of the river, and how about the west side of the river? (Central Pennsylvania).

Prof Wilder.—Either is good. The Peach Yellows have attacked trees there but that does not trouble the apple.

A Member.—In the Cumberland Valley what about the sandstone?

Prof. Wilder.—Where do you find that in the Cumberland Valley? Do you refer to the Pine Lands?

A Member.—Yes.

Prof. Wilder.—That is very good; a good opportunity to grow fruit.

Prof. Surface.—What varieties are to be grown there?

Prof. Wilder.—York Imperial and Stayman Winesap. Jonathan is very worthy of more extensive trial, and the Pine Lands soil is well suited to it. The Gano does very well there, and I think the Rome Beauty well worth thorough trial. You have, of course, very good demonstrations there of several proven varieties.

A Member.—What about the soils in Lancaster?

Prof. Wilder.—The limestone land in Lancaster is very high in price, and just as good or better apple soils can be purchased for much less money. It is well adapted to Grimes Golden and some other of the green varieties. The red sorts often fail to color satisfactorily but York Imperial is profitable. Are you going to buy land or do you already own it?

A Member.—I own it.

Prof. Wilder.—What is it, lime or shale?

A Member.—Shale.

Prof. Wilder.—The shale soil is well worth developing. Well colored attractive fruit of the red varieties may be secured, and the land is reasonable in price. If I did not own any land and were going to buy there to plant fruit trees of any kind I would buy the shale in preference to the limestone.

A Member.—What is the reason for planting green varieties on the limestone?

Prof. Wilder.—In many seasons good color is not secured with the red varieties, especially the varieties of superior quality. With some weak growing sorts like Jonathan a better growth of tree is obtained on soils that are more mellow and porous than those of limestone origin. In some cases there may be additional reasons.

A Member.—I am particularly interested in that region running from Sunbury to Wilkes-Barre.

Prof. Wilder.—A good region for planting, and land is generally cheap. Avoid the bottoms of the narrow valleys. Good fruit soils are found well up the slopes and on the hills where frosts may be largely avoided.

A Member.—What varieties?

Prof. Wilder.—Northern Spy with Wagener filler if the latter plan of planting is desired. Stayman should also prove successful. Smokehouse is also excellent for a fall apple.

A Member.—How about the Baldwin?

Prof. Wilder.—The Baldwin has been very profitable but in certain sections the brown spot has given trouble, and there is some hesitation about planting it extensively until methods of control shall be perfected.

A Member.—Have you gone over York County and looked at the Pigeon Hills?

Prof. Wilder.—Yes, to some extent. The soils are favorable and reasonable in price.

Prof. Stewart.—The question has been raised back here, if you can get land at $10 an acre that is considerably hilly, if it would not be better to add something to that price and get something more nearly like what you want?

Prof. Wilder.—I think so. In those sections even where land can be bought for $3 an acre I would rather pay $40 or $50 than pay the three because the ultimate cost of production is likely to be less on the higher priced land.

Mr. Walton.—How about land at $100 an acre?

Prof. Wilder.—It depends upon where it is located.

Mr. Walton.—South of the Blue Mountain. Would it pay to buy land at this price for the purpose of starting a commercial orchard on a large scale? There is a company being formed here in Harrisburg for that purpose with this end in view.

Prof. Wilder.—If near enough to special markets or other advantages to more than off-set the extra investment there is no reason why it should not be just as good a business venture, provided there is plenty of capital to carry it.

Mr. Walton.—They have plenty of money, but as a money-making proposition?

Prof. Wilder.—I think it all right up to a valuation of $100 an acre, but good apple and peach soils may still be had in favorable locations in this state at one-half that price.

Mr. Walton.—These gentlemen are undecided whether to take land at that price, or land at $10 an acre. The land at $10 is pretty hilly.

Prof. Wilder.—Well, I would avoid very hilly land as a rule; spraying is much more difficult and all orchard operations are more expensive than on smoother ground. Many orchards were planted in Virginia and West Virginia before spraying became necessary,

and it is almost impossible to spray some of them. I would almost rather pay $200 an acre for smoother land than to meet the extra expense of spraying on ground that is too steep. That applies to a good bit of the Albemarle Pippin region.

A Member.—Do not the apples get larger on the limestone soil?

Prof. Wilder.—Not necessarily. I think the shale soil can be handled so as to get just as large fruit. I have seen just as fine Smokehouse apples grown on the sandstone soils near Sunbury as anywhere else. I would not plant the trees quite so thickly on the limestone soil so as to allow for a heavy growth.

A Member.—I am a representative of Bedford County. We have wonderful possibilities over there, and we want you people to come over and see what we have to offer before you decide to buy elsewhere. We have the soil and we have the climate, and every opportunity that any one can ask. You can get land from $20 to $50 an acre, the very best orchard land that can be had.

Prof. Wilder.—I know the soil is there, likewise the opportunity, and several counties in that part of the State which have not been mentioned individually have comparable soil conditions.

Mr. Wertz.—Every mother thinks her baby the prettiest. Franklin County is just the same.

A Member.—What about the possibilities of the Pocono Mountains?

Prof. Wilder.—That is mostly sandstone soil which occurs at higher elevation than the shale. It will cost a little more per acre to bring that soil into a good productive condition than some others. Along the D., L. & W. railroad from Scranton to New York the land over those mountains is exposed to high winds, and that may cause some little trouble with the fruit, especially about blowing off. Then there are other conditions to be considered. You are altogether dependent on one railroad and the cost of transportation under such conditions may prove to be an important item. My remarks do not refer, of course, to the railroad concerned in this case but to a general condition of transportation.

RECENT ADVANCES IN OUR KNOWLEDGE OF LIME-SULPHUR.

By J. P. Stewart, *Experimental Horticulture, State College, Pa.*

Owing to the increasing interest in the subject, I have been asked again to run over the details of making concentrated lime-sulphur. Details are hard to remember, however, and since they are already available for the asking in our Bulletin 99, it has seemed to me wiser to deal here with some of the more general phases of the

subject, presenting rather the principles upon which the details depend. In doing this, it has seemed best to trace out the development somewhat along historical lines, adding briefly in their proper places those features of most importance that we have learned during the past year.

As we have noted before, the career of lime-sulphur as a spray material has been rather checkered. Starting in 1886 at Fresno, Cal., when a Mr. Dusey borrowed a pail full of sheep dip from his neighbor, Covell, thinking that if it killed the lice on sheep it ought also to do it on trees, it speedily became the leading contact insecticide throughout the Pacific Coast. It was then brought East in 1894, soon after the discovery of scale in Virginia, was tried in Maryland, and discarded, being found aparently useless under eastern conditions. It was partially revived by Marlatt in 1900, but failed to secure wide acceptance until after the work of Forbes and others in 1902. From the latter date until approximately 1909, it remained the standard insecticide throughout the country, in spite of its many objectionable and disagreeable features. This was the old, home-boiled, dilute mixture which finally came to be made by using 15 or 20 pounds of lime and 15 pounds of sulphur to 50 gallons of total product.

While this development was taking place in the dilute mixture, another preparation, without the objectionable features, was gradually coming to the front. This was the so-called commercial or factory-boiled lime-sulphur. It was storable, free from sediment, easily applied, and though much denser than the home-made preparation, it was practically free from crystals. Just when and by whom it was first used as an insecticide, I have been unable to discover. It appears, however, that along in 1902 or 1903, a Stock Food Company of Omaha learned that some of their patrons in Utah were buying a few extra barrels of a concentrated cattle-dip for application to trees. Later inquiries and tests showed the value of this, and from that beginning has developed the present remarkable production of commercial lime-sulphur materials. Both types of lime-sulphur insecticides, therefore, came into use rather accidentally and apparently independently, as the result of a transfer in use from dip preparations.

Along in 1908, when the writer became interested in the situation, the making of these dense, non-crystalizing insecticides was supposed to be accomplished by some difficult, factory process, wholly beyond the capabilities of the orchardist, and consequently worth about three times as much to him as we now know they can be readily made for at home.

At this time it was learned that Cordley in Oregon had made a "stock solution" lime-sulphur. Details of his work were meager, however, and not generally available. There also appeared to be some doubt as to the correct ratio of lime to sulphur, and the proper concentration to be used. For example in the version of his formula given by Parrott,[1] a 60-to-125 ratio was advised, while in his own

[1] New York Geneva Bul. 319.

later account,[2] 60-to-110 was used; the latter ratio having appeared in 1906 in a formula used by Thatcher, at one-half the present weights.[3] As to concentration used, it appears that with the larger amounts of ingredients [4] only enough water was added at first to make 45 gallons of mixture, while with the smaller amounts the total was brought up to 60 gallons. No further additions of water were indicated in either account to make up for the losses in boiling, which was to be for one hour or more. After boiling and settling, only the clear liquid obtainable above the sediment was drawn off; and in the former case this amount of liquid was diluted to make the final 50 gallons of *concentrate*. This was again diluted for use, at the rate of 1 to 10 (total), and the sediment was to be re-used in succeeding boilings.

The faults and uncertainities of this method are very evident now; and it was doubtless fortunate for the home-made concentrate that no wide attempt was made to strictly carry it out in orchard practice. It is of interest, however, as marking the advance made up to the early part of 1909.

The next move was made at the Pennslyvania Station. The work had begun before the above accounts appeared, though most of their facts were known. The general attitude and prospects for success at that time may be gathered from a remark by one of our leading insecticidal chemists, then at the Station, whom the writer was trying to enlist in the cause. His advice was to go ahead with the work but not to be disappointed in case nothing was learned, because the whole subject had been studied thoroughly already by chemists, and nothing new was to be expected.

The results of the subsequent work have appeared in various places, and we can here merely mention some of the leading points established.[5] We found that the crystals occurring in the old, dilute preparation were due to excess of lime. The value of this excess was questioned and later proved to be unnecessary against scale, as was already known in the case of fungi. The cause of the crust which develops over concentrates was shown to be due to exposure to air, and its prevention was readily accomplished.

The proper ratio of lime to sulphur was studied, and the ratio of these materials *in solution* was found not to be constant as Thatcher supposed (Wash. Bul. 76) but to vary primarily with increase in density.[6] Thus in dilute solutions the ratio occasionally ran as low as 1 to 1.8, while in dense concentrates it averaged about 1 to 2.5, with individual cases much higher. Owing to losses in making and impurities in the best of our commercial limes, however,

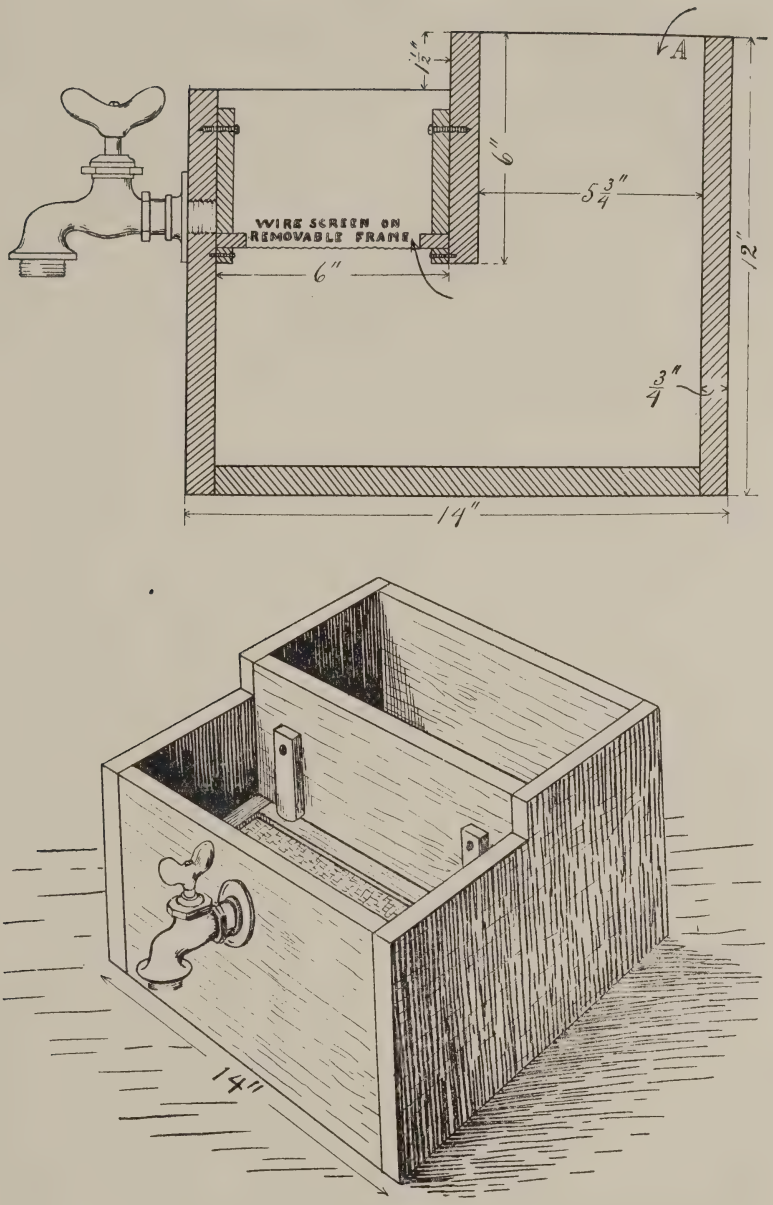
[2] Cordley. Better Fruit, April, 1909.

[3] Washington Bulletin 76.

[4] 60 pounds of lime to 125 pounds of sulphur.

[5] For details and data, see Pennsylvania Station Reports for 1908-09 and 1909-10; Bulletins 92, 99 and 106; Report of the Society for Horticultural Science, 1909; and Rural New Yorker 1910, pp. 944 and 1096. Bulletins 99 and 106: 11-13 contain the essentials of making and use, in condensed form.

[6] The ratio of lime to sulphur in solution is also apparently affected somewhat by ratio of ingredients.



FIGURES 1 AND 2.—(*Original*). A new type of strainer for lime-sulphur or other spray materials. *The liquid enters at "A," passes upward through the screen and is carried where desired through a hose attached to the spigot. The coarse particles thus fall away from the screen instead of accumulating on it. Any solution retained in the sediment may be secured by running through it the water required for the next boiling.*

we found definitely that for orchard conditions the *best ratio of ingredients* is one pound of high calcium lime to two pounds of sulphur.

In connection with the matter of concentration, the relation existing between volume, density and utilization of materials was determined. The greater densities, obtainable with lower volumes of concentrate, were shown to be *associated with less economical use of materials,* and hence to be undesirable. Where storage conditions are to be met, however, a final volume of 1 to 1.1 gallons of total product is about right in the home preparation, for the weights of ingredients named above. Otherwise somewhat greater volumes may be used, diluting according to density in all cases.

The sediment in properly made concentrates was found to *actually* occupy much less than ten per cent. of the total volume, though by settling alone it *apparently* occupied 30 to 50 per cent. Most of it is unobjectionable in the home preparation, but for more readily removing its coarser portions, we have recently made a new type of strainer, the construction of which is shown in the accompanying figure. The usual clogging is avoided in it by straining upward, the coarse particles falling away from the screen instead of accumulating on it as in other strainers.[7]

The amount of sediment was found to be influenced by the manipulation, by the ratio and purity of the materials, and by the amount of boiling. The best index for completed boiling is the evident dissolving of the sulphur granules.

Ordinary winter temperatures were found not to exert any permanent effect on the concentrates, the only danger in freezing aparently being the possible breakage of containers, and the freezing points lowered with increase in density. Acids and carbon dioxid, however, readily break down the solution.

In connection with the *use of lime-sulphur,* the first definite system of dilution according to density was developed, foliage tests were made, some of the conditions influencing spray injury were determined, and the thorough control of scale on apple by summer applications alone was demonstrated. This was accomplished with three sprays, the first being applied immediately after the young began to emerge with the others following at intervals of about ten days, when additional young were observed.[8] The amount of spray injury was found not to depend exactly upon density of application, but rather upon the density attained on the leaf before evaporation is complete. This was affected by the abundance of application, the density of the material applied, and the size and location of the drops retained by the leaves, the younger leaves and under surfaces being most vulnerable.[9] Injury is also especially liable to occur when lime-sulphur is used after applications of bordeaux or after previous applications of lime-sulphur which have

[7] For fuller account of this strainer, see Rural New-Yorker 1911, p. 276.

[8] See our Annual Report for 1909-10, and the Rural New-Yorker 1910, p. 944.

[9] Pennsylvania Report 1908-09: 286-89; and Bul. 99: 15.

broken the epidermis. This accounts for some of the anomalous cases of severe injury that have come to our attention during the last two seasons.[10]

The recent work at various other stations cannot be adequately treated in the present space. The general outburst of activity along all lines of sulphur sprays has been quite remarkable. The excellent work of Scott at Washington in showing the usefulness of the self-boiled preparation, especially in the control of peach diseases, and also of Quaintance in showing its value in the summer control of scale on peach are worthy of special note. Wallace's extensive work at Cornell against apple diseases, his development of a laboratory method of testing fungicides, his demonstration of the special value of the lime-sulphur-lead-arsenate combination, and his emphasis of the relation between broken epidermises, by scab or insects, and lime-sulphur injury are also noteworthy. This injury is thus brought in line with that of Bordeaux, as pointed out by Crandall in Illinois, and with that of arsenicals, as pointed out by Gillette in Iowa (Iowa Bul. 10. 1890). Parrott, at Geneva, has demonstrated the value of sulphur sprays against blister mite, and has shown the worthlessness of the sediment against scale. Van Slyke and Bosworth at the same place have emphasized the general undesirability of magnesium in the lime used in the ingredients; and Waite at Washington has called attention to possible values of copper and iron sulphids. Besides these workers, Taylor in Missouri, Fulmer and Cæsar in Ontario, Bonns in Maine, Ballard and Volck in California, and many others are doing their share in the present movement of advancing, verifying and perfecting our knowledge of the making and use of sulphur sprays, and still there is work to be done.

THE SUMMER SPRAYING OF PEACHES.

By J. P. Stewart, *Experimental Horticulturist, State College, Pa.*

During the season of 1910, an opportunity was offered to the Department of Experimental Horticulture, at State College, to make some further studies on the summer spraying of peaches. A block of trees in the extensive orchard of Mr. W. Fred Reynolds of Bellefonte was very kindly offered for this purpose, and the necessary additional assistance was provided in the Department.[1] The results secured, though not conclusive in all cases, are believed to be of sufficient interest to warrant presentation at this time, especially as a report of progress.

The primary object of spraying peach orchards in summer is to control brown rot. The control of curculio is a pre-requisite for

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[10] Rural New-Yorker 1910: 1096; and Penna. Bul. 106: 11-13.

[1] One of our advanced students, Mr. W. H. Sill, had direct charge of the work, during the writer's absence, and much of the success attained is due to him. Excellent service, in addition to his other duties, was also rendered by Mr. H. F. Hershey, regular assistant in the Department.

this, and the practical prevention of peach scab, the black spotted disease that often cracks the fruit and makes it more or less lop-sided, is incidentally secured. The object in our work was essentially to try out the best known method [2] of accomplishing these ends, and to compare it with other available sprays in order to secure possible improvements. The relative safety of these sprays upon the foliage and fruit was also considered, as well as their effect upon the carrying quality of the fruit in shipment.

For the experiment, a block of some 280 trees about 10 years old was chosen. The peach trees were Early Crawford, which had been planted as fillers among apples, every fourth tree being the latter. This variety was chosen especially because in previous years it had shown more rot than the others in the orchard, and its trees were well covered with blossoms.

Outline of the Experiment.

The plan of the experiment involved three sprayings and nine different treatments, with appropriate "buffers" and checks. In the *first spraying,* all plots except the checks were treated alike, using lead arsenate, lime and water at the rate of 2-2-50 [3] This application was aimed primarily at the curculio and was applied on May 19, just as the calyces or "shucks" were shedding. The *second application* was made a little less than a month later, on June 11 and 14, the "data" trees being all sprayed on the 11th. At this time the different fungicide and arsenical combinations named below were applied. In the *third spraying,* the arsenicals were omitted, the application being made on June 24. For best results in controlling the diseases this third aplication should have been deferred for 3 or 4 weeks, since the fruit proved not to be ready to pick until August 23, or about 8 weeks after our last application, when it should have been only about a month between these dates. All treatments were under the same conditions, however, so that for purposes of comparison the experiment was not appreciably affected.

The materials used in the second and third applications (with arsenicals omitted in the third) were as follows:

Plot I. Check. (Unsprayed throughout).

Plot II. "Buffer." (Three rows of trees, sprayed as in Plot 3, that were included between the data trees and unsprayed portions to avoid *undue* exposure of the former to sources of infection).

[2] The self-boiled lime-sulphur treatment proposed by Scott of United States Department of Agriculture, Bureau of Plant Industry, Bul. 174, 1910.

[3] The lead arsenate was the same throughout the experiment, being kindly furnished us for the purpose by the Grasselli Co., of Cleveland, Ohio. The lime throughout was high in calcium, about 95 per cent. CaO; and the water used was rain water obtained from a cistern. In all cases the applications were fairly heavy, averaging about 2½ gallons to the tree. They were made with a barrel hand-pump in all cases excepting the second and third applications on Plot VI, in which a Niagara gas sprayer was used.

Plot III. Self-boiled lime-sulphur, 8-8-50; and lead arsenate, 2 pounds to 50 gallons. (Made as described by Scott, in U. S. D. A., Bur. of Ent. Cir. **120**: 5-7; and B. P. I. Bul. **174**. 1910).

Plot IV. Lime-sulphur solution, 1.003; and lead arsenate, 2 lb. to 50 gal. (The applied lime-sulphur solution in all cases was made as described by the writer in Penn. Bul. 99, 1910. A density of 1.003 is approximately equal to a dilution of 1 to 100 of our best commercial lime-sulphurs, those testing 1.30 Sp. Gr. or 33½° Baume).

Plot V. Lime-sulphur solution, 1.003; and arsenite of lime, 2 pints to 50 gallons. (The arsenite of lime here and in Plot VIII was made as described in Penn. Bul. 99).

Plot VI. Lime-sulphur solution, 1.003; and lead arsenate, 2 lb. to 50 gal.; applied with carbon dioxid gas sprayer. (This was expected to eliminate the burning by precipitating the sulphur, without losing the fungicidal action).

Plot VII. Sulfocide, 1 to 400; and arsenite of lime, 2 pints to 50 gal. (This combination was not advocated by the manufacturer but was tried to determine results, since we had evidence that the Paris green recommended was unsatisfactory).

Plot VIII. Sulfocide, 1 to 400; an darsenate of lime, 2 pints to 50 gallons. (Tried for reasons indicated in VII).

Plot IX. Pyrox, 5 pounds to 50 gallons of water. (This is a commercial preparation of bordeaux and lead arsenate, which has given good results on apples. It was tried here a little stronger than the manufacturers recommended, but apparently is not desirable for peaches, as later results show).

Plot X. Bordeaux, made with ½-pound copper sulfate, and 6 pounds lime to 50 gallons of water; and lead arsenate, 2 lb. to 50 gal. (This spray was formed by doubling the amount of $CuSO_4$ in the next for comparison with it).

Plot XI. Bordeaux, ¼-6-50; and lead arsenate, 2 lb. to 50 gal. (This spray was recommended as having been in successful use for several years, in Van Lindley orchards of Southern Pines, North Carolina).

Plot XII. Buffer. (Sprayed like XI. See Plot II).

Plot XIII. Check. (Unsprayed).

The plots were adjoining and contained 20 trees each in double rows, excepting II and XII, which contained 30 trees each, in three rows. The data on all plots were taken from 5 or 6 central trees, thus providing in all cases a "buffer" of at least three sprayed rows between the sprayed data trees and unsprayed conditions. It will be noted that the experiment contains six sulphur treatments, and three Bordeaux.

The Weather.

The weather during the time of the experiment was as follows:

MAY 15-31.

Date	Temperature. Maximum	Minimum	Mean	Precipitation
15	56	38	47	0
16	66	34	50	0
17	70	40	55	0
18	66	48	57	.19
19	76	48	62	0
20	72	53	63	.23
21	78	60	69	.20
22	75	55	65	Trace
23	67	56	62	.02
24	80	57	69	.75
25	72	55	64	.65
26	63	46	55	0
27	60	40	50	Trace
28	74	47	62	0
29	77	45	56	.10
30	61	49	55	0
31	50	41	46	Trace

JUNE.

Date	Temperature. Maximum	Minimum	Mean	Precipitation
1	52	40	46	.13
2	64	44	54	Trace
3	62	47	55	.47
4	67	40	54	0
5	59	51	55	.58
6	72	51	62	.03
7	60	47	54	.02
8	74	45	60	0
9	69	45	57	.47
10	59	49	54	.12
11	58	50	54	.69
12	62	52	57	.15
13	72	50	61	0
14	78	55	67	0
15	81	56	69	0
16	69	59	64	.28
17	80	60	70	Trace
18	80	61	71	.07
19	83	60	72	0
20	87	59	73	0
21	88	59	74	0
22	87	64	76	0
23	88	64	76	0
24	80	62	71	0
25	80	50	65	0
26	78	55	67	0
27	81	64	73	.01
28	80	60	70	.77
29	84	60	72	0
30	87	62	75	0

JULY.

Date	Temperature. Maximum	Minimum	Mean	Precipitation
1	89	64	77	0
2	88	67	78	0
3	78	65	72	Trace
4	76	65	71	Trace
5	79	52	66	0
6	82	57	70	0
7	76	57	67	.90
8	86	64	75	0
9	86	60	73	.31
10	87	62	75	.08
11	86	60	73	0
12	84	61	73	.81
13	82	66	74	.35
14	83	53	68	0
15	84	60	72	0
16	85	62	74	.08
17	73	60	67	.53
18	74	55	65	Trace
19	75	51	63	0
20	81	51	66	0
21	72	59	66	0
22	84	60	72	0
23	85	67	76	.15
24	91	63	77	0
25	86	63	75	0
26	80	62	71	0
27	83	58	71	Trace
28	79	61	70	.83
29	84	54	69	0
30	80	64	72	.02
31	75	53	64	0

AUGUST.

Date	Temperature. Maximum	Minimum	Mean	Precipitation
1	78	46	62	0
2	85	54	70	0
3	88	50	69	0
4	86	71	79	Trace
5	74	56	65	0
6	77	48	63	0
7	79	53	66	0
8	72	59	66	.66
9	77	56	67	.02
10	74	58	66	.78
11	80	58	69	.02
12	80	54	67	0
13	81	54	68	0
14	83	58	71	0
15	84	58	71	0
16	78	63	71	0
17	75	66	71	0
18	73	62	68	.37
19	75	64	70	.22
20	77	49	63	0
21	79	49	64	0
22	76	60	68	0
23	82	60	71	0
24	82	64	73	0
25	84	64	74	0

Results.

Since the injury caused by the spray itself is one of the most important matters in peach spraying, special attention was given to it throughout the experiment. The extent of the injury as well as its nature was noted. The amounts of twig injury and of fruit and leaf-drop were determined by trial counts and estimates. The injury to the picked fruit was determined by the random-sample method described below. The approximate maximum injuries are shown in Table II. These injuries were not all at their maximum at the same time, those from the Bordeaux preparations developing most slowly. The fruit drop recorded against the checks approximates that occurring on the unsprayed trees from various causes, up to picking time.

TABLE II.

Effect of Sprays on Fruit, Foliage and Twigs.

Plot	Treatment	Fruits in Sample*	Injured by Spray	Per cent. Fruit Injured	Per cent. Fruit Drop	Per cent. Twig Injury	Per cent. Leaf Drop
I.	Check, ...	549	0	0	5-10	0	0
III.	Self-boiled lime-sulphur and Arsenate, ...	430	0	0	0	0	Some shot-hole injury
IV.	L-S and Arsenate, ...	424	0	0	5	5	5
V.	L-S and Arsenite, ...	487	11	2.26	5	5	10
VI.	L-S and Arsenate applied with CO_2, ...	453	49	10.8	50	20	50
VII.	Sulfocide and Arsenate, ...	245	17	6.94	90	70	90
VIII.	Sulfocide and Arsenite, ...	359	38	10.58	40	30	50
IX	Pyrox (5-50), ...	377	178	47.2	50	50	65
X.	Bordeaux (½-6-50) and Arsenate, ...	515	55	10.7	1	0	considerable shot-holing
XI.	Bordeaux (¼-6-50) and Arsenate, ...	459	43	9.8	5	0	considerable shot-holing
XIII.	Check, ...	495	0	0	5-10	0	0

It will be readily observed that the amount of injury to fruit, foliage and twigs is so great in treatments VI to IX as to rule them out at once from serious consideration as summer sprays for

*In this table and those following, the effect of the various treatments on the picked fruit was determined in all cases by the random-sample method. In obtaining these samples, *all* the fruit on the data trees of a given plot was picked and weighed. From each basket of this fruit a sample was taken at random and placed with other similar samples, enough being taken from each basket to make a total of one or two bushels in the total sample from each plot. This fruit was carefully examined for rot, scab and curculio or spray injury, and the per cent. of each found in the sample was considered to be a correct representation of the fruit conditions of the plot. The accuracy of this method of course increases with the number of fruits in the sample. In most cases our numbers seemed to be large enough. But from the results obtained in one or two instances as indicated later, it seems probable that some injustice was done.

peaches. From the injury to the fruit, this is also practically true of X and XI; with V in the doubtful class, despite its efficiency which appears later.

The nature of the injury is of special interest, primarily because it is only through a correct understanding of its nature that we can hope to learn its control, either on peaches or other fruits. In plots VI, VII, IX and X for example, the *injury to the fruit* was apparently identical in character, though the fungicides evidently varied. There can be little doubt, therefore, that this injury is directly due to the arsenical, since it is the only common material, and also since a similar injury is reported by Haywood and McDonnell [4] where lead arsenate only was used.

FIGURE 1.—Typical injured peaches from plots VI to XI. The injury is apparently due to the arsenical directly, with the fungicide aiding indirectly.

The general appearance of the injury on the picked fruit is shown in Figure 1. Most of the dropped fruit on these plots was similarly affected. The injury was most frequent where the spray material had collected on the fruit in some quantity, especially between the fruit and its adjacent twig or between fruits, and dried. The injured portion became dark, sunken, more or less hardened and leathery, and frequently cracked away from the sound portion and emitted gum. The injury to the foliage and twigs is also doubtless largely of the same nature, though not of necessity entirely so, since it is well known that the foliage is quite susceptible to some injury from the fungicides alone, even at the low strengths used.

Assuming then that the injury to the fruit at any rate, is primarily due the arsenicals, the question arises as to how it is brought about. The arsenate evidently did not become soluble with water and lime alone, in sufficient quantities to cause the observed dam-

[4] U. S. Bureau of Chemistry, Bul. 131: 36-37. 1910.

age, as is apparently proved by the fact that no perceptible injury resulted in 3½ weeks following the first application. Atmospheric carbon dioxid, which has been suggested as the possible dissolving agent, appears to have no action on lead arsenate directly, since Haywood and McDonnell [5] have found that lead arsenate of either composition, $PbHAsO_4$ or $Pb_3(AsO_4)_2$, is rather "less soluble in distilled water saturated with carbon dioxid, even when heated to 50° C., than in cold distilled water free from carbon dioxid." Certain salts, especially of sodium, when present in the spray water even in relatively small quantities, are well known to exert a very marked solvent action on lead arsenate.[6] But even this can hardly have been operative in our results, since only rain water was used. Our conclusion therefore is that the addition of the fungicides, especially those in soluble form, have acted like other salts in solution, and have brought about the dissolving of the arsenicals.

In plot III, the fungicide was not in solution to any appreciable extent, hence little or no action.[7] In IV, a reaction occurs, but the dissolved arsenate is reprecipitated as rapidly as formed, probably largely as calcium arsenate, and thus the injury is relatively slight. In plot VI, however, where carbon dioxid also is added, soluble arsenic was evidently set free in considerable quantities. The gas therefore was apparently able to break down the secondary compounds formed in IV, probably changing the arsenate of calcium to the carbonate in the process. Regardless of the exact reaction, however, the use of the gas sprayer in connection with the *combined* lime-sulphur arsenate spray is obviously very dangerous and not to be recommended. On the other hand, in the third application with the gas and lime-sulphur alone, no additional damage was done to the trees of the plot and none whatever to adjacent trees sprayed only at this time. In this plot, therefore, all the injury is unquestionably due to modifications in the arsenical.[8]

In plots VII and VIII, this solvent action of the fungicide upon the arsenicals is very evident and easily explained. Here we had a material, Sulfocide, that according to our analysis is a soda-sulphur compound, to which has been added a neutral organic substance that renders it viscid. It has been used alone on peaches, at 1 to 400 with no appreciable injury. But when either of the arsenicals used by us is added, there results the excessive injury shown in Table II. The addition of paris green is evidently no safer than that of lead arsenate, as indicated by the results of Dr. Clinton in Connecticut,[9] and also by disastrous results on pears

[5] U. S. Bureau of Chemistry, Bul. 131: 45-46. 1910.

[6] U. S. Bureau of Chemistry, Bul. 131: 46-48; and Headden, Colo. Bul. 131: 22. 1910.

[7] In any case the reaction can occur only to the extent in which *both* reacting materials are in solution, a point which seems to have been lost sight of in many discussions of this subject.

[8] Similar results are reported by Wallace, in a forthcoming bulletin, No. 288, of the Cornell Station.

[9] Connecticut Report 1909-10, p. 611. In our results, it is noteworthy that the injury with arsenite of lime was only about half that with lead arsenate, though of course neither arsenical is usable in this combination.

obtained this past season by our President, Mr. Hiester. In short, the soda-sulphur fungicide in this case acts like other sodium salts in rendering soluble the arsenicals combined with it. Similarly in plot V, it is probably the trace of sodium that still remains in our preparation of the arsenical, which is responsible for the burning obtained, since calcium arsenite itself is apparently less soluble than calcium arsenate, which is formed to some extent in IV. The action with Bordeaux, in plots IX to XI, may be somewhat different, but it is of less importance to us in this discussion.

Summary of Spray-Injury.—In this whole matter of sulphur-arsenical injury therefore it seems (1) that when used at proper dilutions, most of the injury is due directly to the arsenical, but indirectly to the solvent action of the fungicide used with it; (2) that certain sulphur sprays are entirely unusable with present arsenicals since they contain soda; (3) that the use of spray water containing appreciable quantities of sodium salts, or the use of commercial lime-sulphurs to which sodium or potash salts have been added, is especially dangerous in connection with arsenicals; and (4) that the solving of the spray injury problem, so far as it depends on the materials themselves, probably consists in the elimination of the solvent action of the fungicide by properly putting it out of solution, coupled with the use of an arsenical of the highest grade. The details of this process, we expect to try to work out in the future.

TABLE III.

Effect of Sprays on Yield and General Soundness of Fruit.

Plot	Treatment	Total Yields Lb.	Picked Fruit Lb. per Tree	No. of Fruits in sample*	Number entirely sound	Per cent. sound
I.	Check,	258	50	671	34	5.07
III.	Self-boiled and Arsenate,	427	84.3	463	302	65.7
IV.	L-S and Arsenate,	547	108.4	475	310	65.47
V.	L-S and Arsenite,	399	79.2	562	414	73.6
VI.	L-S and Arsenate applied with CO_2,	359	70.4	627	428	68.2
VII.	Sulfocide and Arsenate,	177	34.8	322	171	53.1
VIII.	Sulfocide and Arsenite,	342	66.7	485	298	61.5
IX.	Pyrox (5-50),	299	50.9	1107	667	60.34
X.	Bordeaux (½-6-50) and Arsenate,	649	127.8	679	502	73.9
XI.	Bordeaux (¼-6-50) and Arsenate,	564	110.1	459	322	70.3
XIII.	Check,	374	72.9	612	101	16.5

In Table III, we have a partial representation of the influence of our treatments upon yield and general soundness of the fruit.

*The samples in this case include both picked and fallen fruit and in all other tables picked fruit only is considered.

We say "partial" because the yield differences are only partially attributable to the sprays, the differences being chiefly due to variations in the original crops, in the size of the trees, and in the amount of thinning. Some of the low yields, however, those on plots VII and IX, are rather directly connected with the materials applied, on account of the resulting fruit drop. The generally higher yields of the other sprayed plots, as compared with the checks, are also doubtless due to reduction of loss from curculio and rot.

The differences in soundness are more significant. On the checks, the perfectly sound fruit ran from 5 to 16.5 per cent., while on the best sprayed plots it ran from 65 to 73 per cent. It will be observed that the bordeaux (½-6-50) has given the highest per cent. of sound fruit, followed very closely by the sulphur solution and lime arsenite. Plots III and IV, however, were lowered in soundness primarily by their greater damage from curculio, shown later in Table III. With this exception their fruit was the best of all.

The soundness of the fruit on VI is also notably high, thus showing that the fungicidal properties were not lost by the precipitation of the sulphur. The injury came quickly on this plot, the damage being done by the second spraying; and recovery was also very rapid.

Effect of the Sprays on Color.—The fruits remaining on the tree, in plot VI especially, averaged large and were *extremely brilliantly colored.* This was probably due to stimulation by the arsenic, when present in less than killing strengths, coupled with the decreased foliage which admitted more light to the fruit. A similar increase in color appeared in all the sprayed plots, the increase being roughly proportional to the severity of the arsenical injury.

TABLE IV.

Effect of Sprays on Curculio.

Plot	Treatment	No. of Fruits in sample	No. injured by curculio	Per cent. injured
I.	Check,	549	135	24.7
III.	Self-boiled and Arsenate,	430	120	27.9
IV.	L-S and Arsenate,	424	88	20.75
V.	L-S and Arsenite,	487	14	2.9
VI.	L-S and Arsenate, applied with CO_2,	453	42	9.27
VII.	Sulfocide and Arsenate,	245	51	20.8
VIII.	Sulfocide and Arsenite,	359	13	3.62
IX.	Pyrox (5-50),	377	13	3.45
X.	Bordeaux (½-6-50) and Arsenate,	515	41	7.96
XI.	Bordeaux (¼-6-50) and Arsenate,	459	22	4.8
XIII.	Check,	495	129	25.1

Table IV shows the effect of the treatments in controlling curculio. It contains some surprising results, some of which may be due to accidents of sampling or to other elements of chance within the experiment, and more repetitions are needed before drawing final conclusions. The first surprise is in the remarkable efficiency displayed by arsenite of lime, in the second application, in both plots in which it occurs (V and VIII). The other is the equally surprising failure of lead arsenate in certain of its plots III, IV and VII). We do not attempt to explain this, further than to say that some of the inequalities are due to the fact that the droped fruit was not here considered and, in the rotted fruit, the curculio injury was often obscured so that it could not be recorded with certainty. The plots with considerable dropping and rotting therefore doubtless escaped being charged with some of their insect injury. The relative injury is presented, however, because of its bearing upon some of the results that follow.

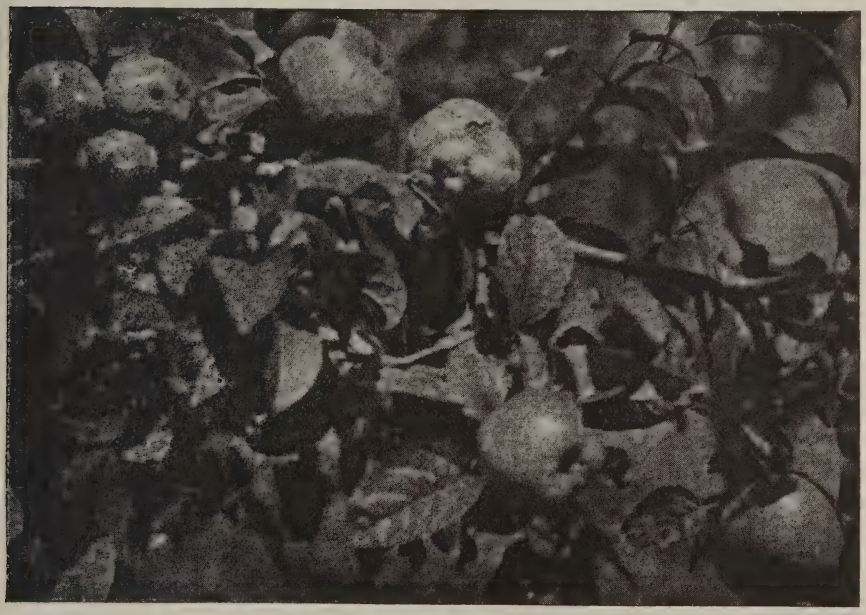

FIGURE 2.—Unsprayed apples, showing effects of curculio. These marks are caused by feeding or egg-laying punctures that failed to develop larvæ. When the eggs hatch, the fruit drops.

An interesting by-product was secured in this connection in some remarkable control of curculio on the apple trees within the experiment, which were sprayed along with the peach. The condition of the apples on unsprayed and sprayed trees is shown in Figures 2 and 3. These results held practically throughout the experiment.

The control of curculió in this case is the more remarkable because of the relatively late applications of the arsenicals, the first spraying being about 10 or 15 days after petal fall on the apples, and the second about three and one-half weeks later, as indicated above. Incidentally, we may say that the control of curculio is doubtless of more importance on apples than is generally supposed. We know of one instance, for example, where over 80 per cent. of the June drop apples were found affected with curculio larvæ. We have been told heretofore that, in the apple, if the fruit drops the egg of the curculio hatches. In the writer's opinion, it is probably more correct to say that if the egg hatches, the fruit drops, the former statement merely having "the cart before the horse."

FIGURE 3.—Apples sprayed with lead arsenate and lime-sulphur. The sprayed trees were of the same variety and location as those shown in Fig. 2.

In the control of curculio on apple, however, we do not say that the times indicated above are necessarily the best. That is a problem for the entomologist. We are merely calling attention to one case of quite thorough control at the times indicated, primarily with lead arsenate and lime-sulphur, though certain other materials were at least equally effective.

TABLE V.

Effect of Sprays on Scab and Brown Rot of Peaches.

Plot	Treatment	No. of Fruits in sample	No. Fruits with Scab	Per cent. Scab	No. Fruits with Rot	Per cent. Rot
I.	Check, ...	549	470	85.6	262	47.7
III.	Self-boiled and Arsenate, ...	430	28	6.57	35	8.2
IV.	L-S and Arsenate, ...	424	31	7.3	92	21.7
V.	L-S and Arsenite, ...	487	79	16.2	55	11.33
VI.	L-S and Arsenate, applied with CO_2, ...	453	42	9.27	51	11.26
VII.	Sulfocide and Arsenate, ...	245	36	14.7	30	12.24
VIII.	Sulfocide and Arsenite, ...	359	82	22.8	30	8.36
IX.	Pyrox (5-50), ...	377	20	5.3	80	21.2
X.	Bordeaux (½-6-50) and Arsenate, ...	515	38	7.37	37	7.2
XI.	Bordeaux (¼-6-50) and Arsenate, ...	459	48	10.48	43	9.4
XIII.	Check, ...	495	443	89.5	97	19.6

In Table V, in which direct fungicidal values are compared, first place plainly lies between plots III and X, which are practically equal in their per cent. of scab and rot. The advantage is with III, however, since the conditions near it were apparently more severe, as indicated by the nearest checks. The rot reduction on plot XIII was probably due to its being within two or three rows of the edge of the orchard, at which there was a sudden steep break or descent in the hill, thus affording better ventilation or air drainage. This did not affect the amount of scab, however, and it is doubtful whether the reduced-rot influence extended much beyond the adjoining plots. The high efficiency of the Bordeaux of plot X is certainly worthy of note, however, and of further trial.

It will be observed that the sulphur-arsenate combination in plot IV controlled scab very well, reducing it from an average of 87.5 per cent. on the checks to 7.3 per cent. but that it apparently failed rather badly in rot-control, reducing it only about one-half. In plot VI, however, the same materials applied with carbon-dioxid, which we have seen is an undesirable treatment, show very satisfactory control. This is quite surprising, especially in view of the increased fungicidal action obtained from this combination by Wallace, and it is another of the cases that we do not attempt to explain. We believe, though, that the showing of the figures in IV, against rot is worse than the actual facts, due to accidents of sampling in this plot as already noted in connection with Table IV. It is probable that about 15 per cent. of rot is more nearly correct. Even at that the advantage in Plots V and VI is probably connected with their better control of curculio and to the much greater amount of sunlight in VI as a result of loss in foliage. These conditions also doubtless partly account for the excellent showing against rot

in VIII, another undesirable treatment. It should be noted especially, however, that the precipation of the sulphur in VI at least did no appreciable damage to its fungicidal value.

Influence of Sprays on Carrying Quality.

Any treatment that improves the carrying quality of such a short-lived fruit as peaches is of great importance. To determine the effect of our most promising sprays on this point, some fifteen half-bushels of fruit were taken from each of the plots indicated in Table VI. This fruit without further spraying, was placed in a car of peaches for shipment from Bellefonte to DuBois, Pa.

The test turned out to be a particularly severe one, inasmuch as the car was left un-iced and un-ventilated and, owing to various delays, it failed to reach its destination for fruit delivery until August 26, three days after the fruit was picked. The condition of the fruit when examined by Mr. Sill is shown in Table VI.

TABLE VI.

Effect of Different Sprays on Carrying Quality of Peaches.

Plot	Treatment	Hours between shipment and examination	No. of Fruits examined	Number rotted	Per cent. rotted
III.	Self-boiled lime-sulphur and lead arsenate,	52	166	33	19.87
IV	L-S and lead arsenate,	53	200	94	47.
V.	L-S and lime arsenite,	51	216	31	14.32
XI.	Dilute Bordeaux and lead arsenate,	49	181	62	34.25
XIII.	Check,	50	144	144	100.

The unfavorable conditions of shipment, with the accompanying rapid respiration of the peaches, developed a thoroughly stifling heat in the unventilated car, and furnished ideal conditions for rot. The result was that the unsprayed fruit showed 100 per cent. of rot as indicated in the table. Under the same conditions the rot on the sprayed fruit was reduced to 14.3 per cent. in one case, and to 19.8 per cent. in another. Such improvements in carrying quality alone certainly justify the practice of spraying.

The difference observed between plots IV and V is probably largely due again to the difference of curculio injury, coupled with the larger amount of rot present in the fruit when picked. This gave a greater chance for infection in passing over the mechanical sizer, which was used in grading the fruit. It will be noted further that throughout the experiment, excepting scab control, arsenite of lime [10] in the second sulphur spray has apparently proved a little more efficient and a little more dangerous than lead arsenate. This

greater danger, and also the unfavorable results with the arsenite reported by Wallace at Cornell, make it inadvisable as yet to recommend its use. For the present, therefore, it appears to be safest to use high grade lead arsenate in connection with lime-sulphur sprays.

The self-boiled preparation again shows its marked superiority over the bordeaux. If we disregard its failure against curculio, which may have been accidental in this instance, it still remains the safest and most reliable peach spray that we know, and the only one that we can safely recommend on a large scale for this fruit. The excellent showing of the clear solution in certain instances, however, would indicate that with a little more knowledge of injury-control it may yet supercede the self-boiled, at least in the third application. This is primarily because of its apparently equal efficiency, even at the high dilutions required, together with its greater economy and convenience and its lessened staining of the fruit.

Prof. J. W. Yoder, accompanied on the piano by Mr. Berger, sang several selections during the evening which were very acceptable.

Adjournment.

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[10] It should be remembered that this arsenite of lime was made according to the formula which we presented in Buls. 92 and 99. It still doubtless has its faults, but it apparently is less dangerous than the material reported harmful by Scott, which was made by another method.

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